Australian Government

UET Transmission, Distribution and Rail Sector

Release 3.0

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UET Transmission, Distribution and Rail Sector

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Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET20321 Certificate II in ESI - Powerline Vegetation Control

Modification History

Release 2. PUAWHS002 Maintain safety at an incident scene added to Group A electives. AHCPCM201 Recognise plants moved from Group B to Group A electives.

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) or the vegetation control industry as a Powerline Vegetation Control Worker.

This qualification covers vegetation control work at and above ground level in the vicinity of live electrical apparatus. It also includes complying with relevant legislation, applicable industry guidelines, codes of practices or other related requirements for safe work in the vicinity of live electrical apparatus.

The application of the skills and knowledge described within the units in this qualification may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **8 units** comprising:

- **5 core units** listed below; plus
- **2 elective units** from Group A listed below; plus
- **1 elective unit** from any group listed below within this qualification or, with appropriate contextualisation, from a qualification in this or any other endorsed Training Package, provided selected unit contributes to the vocational outcome of the qualification.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with. Prerequisites attached to any of the units must be obtained and are additional to the number of units required for the qualification.

Where a prerequisite is attached to a unit it is identified by the symbol ∟.

Core units

AHCMOM213 Operate and maintain chainsaws

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRVC001 Apply work health and safety requirements for powerline vegetation control

UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

∟UETDREL002 Comply with environmental requirements

∟UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

∟UETDRVC001 Apply work health and safety requirements for powerline vegetation control

Group A

AHCPCM204 Recognise plants

UETDRVC002 Assess vegetation in an electricity supply industry environment

∟UETDREL002 Comply with environmental requirements

∟UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

∟UETDRVC001 Apply work health and safety requirements for powerline vegetation control

UETDRVC004 Control vegetation in the vicinity of live electrical apparatus from an elevated work platform

∟UETDREL002 Comply with environmental requirements

∟UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

∟UETDRVC001 Apply work health and safety requirements for powerline vegetation control

∟UETDRVC007 Control vegetation using pruning techniques

∟UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

UETDRVC005 Control vegetation in the vicinity of live electrical apparatus from ground level

∟UETDREL002 Comply with environmental requirements

∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

∟ UETDRVC001 Apply work health and safety requirements for powerline vegetation control

∟ UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

UETDRVC006 Control vegetation in the vicinity of live electrical apparatus from within the tree

∟ UETDREL002 Comply with environmental requirements

∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

∟ UETDRVC001 Apply work health and safety requirements for powerline vegetation control

∟ UETDRVC007 Control vegetation using pruning techniques

∟ UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

UETDRVC007 Control vegetation using pruning techniques

∟ UETDREL002 Comply with environmental requirements

∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

∟ UETDRVC001 Apply work health and safety requirements for powerline vegetation control

UETDRVC010 Perform rescue from within a tree in the vicinity of live electrical apparatus

∟ UETDREL002 Comply with environmental requirements

∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

∟ UETDRVC001 Apply work health and safety requirements for powerline vegetation control

∟ UETDRVC006 Control vegetation in the vicinity of live electrical apparatus from within the tree

∟ UETDRVC007 Control vegetation using pruning techniques

∟ UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

UETDRVC011 Use specialised plant to cut vegetation above ground in the vicinity of live electrical apparatus

∟ UETDREL002 Comply with environmental requirements

∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a

non-electrical worker

∟ UETDRVC001 Apply work health and safety requirements for powerline vegetation control

∟ UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

Group B

AHCARB322	Access trees for inspection
AHCCHM201	Apply chemicals under supervision
AHCMOM304	Operate machinery and equipment
AHCPCM205	Fell small trees ∟ AHCMOM213 Operate and maintain chainsaws
FWPHAR2208	Operate a mobile chipper/mulcher
PUAWHS002	Maintain safety at an incident scene
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

Qualification Mapping Information

This qualification replaces and is equivalent to UET20319 Certificate II in ESI – Powerline Vegetation Control

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET20621 Certificate II in ESI - Asset Inspection and Testing

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as an Asset Inspector.

This qualification covers inspecting, testing and reporting on the status of electricity network assets, including poles, hardware, cables, overhead conductors, public lighting and electrical apparatus. It also includes the use of specialised asset inspection equipment and software applications.

The application of the skills and knowledge described within the units in this qualification may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **8 units** of competency comprising:

- **6 core units** listed below; plus
- **2 elective units** from the elective units listed below, of which, 1 elective unit may be selected, with appropriate contextualisation, from a qualification in this or any other endorsed Training Package, provided the selected unit contributes to the vocational outcome of the qualification.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with. Prerequisites attached to any of the units must be obtained and are additional to the number of units required for the qualification.

Where a prerequisite is attached to a unit it is identified by the symbol ∟.

Core units

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace

UETDRAI001	Inspect and test poles at and below ground level ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace and ∟ UETDREL002 Comply with environmental requirements ∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker or ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRAI002	Inspect poles, hardware and electrical apparatus ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟ UETDREL002 Comply with environmental requirements ∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker
UETDRAI005	Use asset inspection equipment ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟ UETDREL002 Comply with environmental requirements ∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker
UETDREL002	Comply with environmental requirements
UETDREL006	Work safely in the vicinity of live electrical apparatus as a non-electrical worker

Elective units

AVIW0006	Perform infrastructure inspections using remote operated systems
UETDRAI003	Perform minor maintenance on electricity network assets ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟ UETDREL002 Comply with environmental requirements ∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRAI004	Treat poles
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟UETDREL002 Comply with environmental requirements
	∟UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker
UETDRDU002	Inspect underground electrical apparatus
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	and
	∟UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker
	or
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus

Qualification Mapping Information

This qualification replaces and is equivalent to UET20619 Certificate II in ESI – Asset Inspection

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET20422 Certificate II in Transmission Line Construction

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 3.0.

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a Transmission Line Construction Worker.

This qualification covers assembling transmission structures and installing hardware. It also includes stringing transmission overhead conductors prior to being tensioned and terminated.

The application of the skills and knowledge described within the units in this qualification may require a licence/registration to practice in the workplace.

High risk work (HRW) licences are required for dogging work and rigging as outlined on the Safe Work Australia website.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this qualification.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of 10 units of competency comprising:

- 8 core units listed below; plus
- 2 elective units from the elective units listed below, of which, 1 elective unit may be selected, with appropriate contextualisation, from a qualification in this or any other endorsed Training Package, provided the selected unit contributes to the vocational outcome of the qualification.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with. Prerequisites attached to any of the units must be obtained and are additional to the number of units required for the qualification.

Where a prerequisite is attached to a unit it is identified by the symbol ∟.

Core units

CPCCLDG3001 Licence to perform dogging

CPCCLRG3001	Licence to perform rigging basic level
	∟ CPCCLDG3001 Licence to perform dogging
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UETDREL002	Comply with environmental requirements
UETDREL006	Work safely in the vicinity of live electrical apparatus as a non-electrical worker
UETDRTO015	Assemble and erect transmission structures
	∟ CPCCLDG3001 Licence to perform dogging
	∟ CPCCLRG3001 Licence to perform rigging basic level
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UETDREL002 Comply with environmental requirements
UETDRTO016	Install transmission structure hardware
	∟ CPCCLDG3001 Licence to perform dogging
	∟ CPCCLRG3001 Licence to perform rigging basic level
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UETDREL002 Comply with environmental requirements
UETDRTO017	String overhead transmission conductors
	∟ CPCCLDG3001 Licence to perform dogging
	∟ CPCCLRG3001 Licence to perform rigging basic level
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UETDREL002 Comply with environmental requirements
	∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker
	∟ UETDRTO015 Assemble and erect transmission structures
	∟ UETDRTO016 Install transmission structure hardware

Elective Units

CPCCLRG3002	Licence to perform rigging intermediate level
	∟ CPCCLRG3001 Licence to perform rigging basic level

CPCCLRG4001	Licence to perform rigging advanced level ∟CPCCLRG3002 Licence to perform rigging intermediate level
RIIHAN309F	Conduct telescopic materials handler operations
TLILIC0003	Licence to operate a forklift truck
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)
TLILIC0024	Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)
TLILIC2015	Licence to drive a medium rigid vehicle
TLILIC2016	Licence to drive a heavy rigid vehicle

Qualification Mapping Information

This qualification replaces and is not equivalent to UET20421 Certificate II in Transmission Structure and Line Assembly

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET30521 Certificate III in ESI - Transmission Overhead

Modification History

Release 2. Updated superseded TLI elective units.

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as an Overhead Transmission Lineworker.

This qualification covers work on transmission overhead powerlines, including the installation, inspection and maintenance of towers, poles, structures, conductors and hardware.

The application of the skills and knowledge described within the units in this qualification may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **19 units** comprising:

- **17 core units** listed below; plus
- **2 electives units** from the elective units listed below, of which, 1 elective unit may be selected, with appropriate contextualisation, from a qualification in this or any other endorsed Training Package, provided the selected unit contributes to the vocational outcome of the qualification.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with. Prerequisites attached to any of the units must be obtained and are additional to the number of units required for the qualification.

Where a prerequisite is attached to a unit it is identified by the symbol ∟.

Core units

CPCCLDG3001 Licence to perform dogging

CPCCLRG3001 Licence to perform rigging basic level

∟ CPCCLDG3001 Licence to perform dogging

TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0044 Solve problems in multiple path circuits

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0046 Solve problems in single path circuits

UEECD0046 Solve problems in single path circuits

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

and

∟ UEECD0043 Solve problems in direct current circuits

or

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

∟ UEECD0043 Solve problems in direct current circuits

or

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDRTO004 Inspect and maintain transmission overhead network

∟ CPCCLDG3001 Licence to perform dogging

∟ CPCCLRG3001 Licence to perform rigging basic level

∟ TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRTO005 Inspect transmission structures, conductors and hardware

∟ UETDRTO006 Install and maintain transmission conductors

∟ UETDRTO007 Install and maintain transmission structures and hardware

UETDRTO005 Inspect transmission structures, conductors and hardware

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTO006 Install and maintain transmission conductors

∟ CPCCLRG3001 Licence to perform rigging basic level

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRTO007 Install and maintain transmission structures and hardware

UETDRTO007 Install and maintain transmission structures and hardware

∟ CPCCLRG3001 Licence to perform rigging basic level

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

Elective Group

AHCMOM213 Operate and maintain chainsaws

AVIW0006 Perform infrastructure inspections using remote operated systems

CPCCLRG3002 Licence to perform rigging intermediate level

∟ CPCCLRG3001 Licence to perform rigging basic level

CPCCLRG4001 Licence to perform rigging advanced level

∟ CPCCLRG3002 Licence to perform rigging intermediate level

ICTWHS202	Work safely in a radio frequency electromagnetic radiation environment
TLILIC0003	Licence to operate a forklift truck
TLILIC0022	Licence to operate a slewing mobile crane (up to 20 tonnes)
TLILIC0024	Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)
TLILIC2016	Licence to drive a heavy rigid vehicle
UETDRDO001	Inspect overhead poles, structures and electrical apparatus ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRIS007	Install and maintain distribution overhead conductors and cables ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components ∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications ∟ UETDREL001 Apply environmental requirements ∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS012 Install and maintain poles, structures and hardware
UETDRIS008	Install and maintain electrical apparatus ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components ∟ UEECD0044 Solve problems in multiple path circuits ∟ UEECD0046 Solve problems in single path circuits ∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

and

∟ UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟ UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

or

∟ UETDRIS007 Install and maintain overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

UETDRIS012 Install and maintain poles, structures and hardware

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRSB001 Perform substation switching operations to a given schedule

UETDRVC003 Control vegetation for powerline work

∟ AHCMOM213 Operate and maintain chainsaws

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

Qualification Mapping Information

This qualification replaces and is equivalent to UET30519 Certificate III in ESI – Power Systems – Transmission Overhead

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET30621 Certificate III in ESI - Distribution Overhead

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as an Overhead Distribution Lineworker.

This qualification covers the installation, maintenance and inspection of poles, structures, hardware, electrical apparatus and the use of support plant, tools and equipment.

The application of the skills and knowledge described within the units in this qualification may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **24 units** comprising:

- **20 core units** listed below; plus
- **4 elective units** from the elective units listed below, of which, 1 elective unit may be selected with appropriate contextualisation from a qualification in this or any other endorsed Training Package, provided the selected unit contributes to the vocational outcome of the qualification.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with. Prerequisites attached to any of the units must be obtained and are additional to the number of units required for the qualification.

Where a prerequisite is attached to a unit it is identified by the symbol ∟.

Core units

AHCMOM213 Operate and maintain chainsaws

CPCCLDG3001 Licence to perform dogging

TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEECD0044	Solve problems in multiple path circuits ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟UEECD0046 Solve problems in single path circuits
UEECD0046	Solve problems in single path circuits ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEEEL0020	Solve problems in low voltage a.c. circuits ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟UEEEL0021 Solve problems in magnetic and electromagnetic devices and ∟UEECD0043 Solve problems in direct current circuits or ∟UEECD0044 Solve problems in multiple path circuits ∟UEECD0046 Solve problems in single path circuits
UEEEL0021	Solve problems in magnetic and electromagnetic devices ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace and ∟UEECD0043 Solve problems in direct current circuits or ∟UEECD0044 Solve problems in multiple path circuits

∟UEECD0046 Solve problems in single path circuits

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDRDO001 Inspect overhead poles, structures and electrical apparatus

∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟UETDREL001 Apply environmental requirements

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRDO005 Maintain overhead energised low voltage distribution network

∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟UEECD0044 Solve problems in multiple path circuits

∟UEECD0046 Solve problems in single path circuits

∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟UEEEL0020 Solve problems in low voltage a.c. circuits

∟UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

UETDRDO006 Maintain, test and verify distribution overhead network

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDRDO001 Inspect overhead poles, structures and electrical apparatus

∟ UETDRDO005 Maintain overhead energised low voltage distribution network

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS008 Install and maintain electrical apparatus

∟ UETDRIS010 Install and maintain low voltage overhead services

∟ UETDRIS012 Install and maintain poles, structures and hardware

UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS012 Install and maintain poles, structures and hardware

UETDRIS008 Install and maintain electrical apparatus

∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟UEECD0044 Solve problems in multiple path circuits

∟UEECD0046 Solve problems in single path circuits

∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟UEEEL0020 Solve problems in low voltage a.c. circuits

∟UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

and

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

or

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

UETDRIS010 Install and maintain low voltage overhead services

∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟UEECD0044 Solve problems in multiple path circuits

∟UEECD0046 Solve problems in single path circuits

∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟UEEEL0020 Solve problems in low voltage a.c. circuits

∟UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟UETDREL001 Apply environmental requirements

	∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRIS012	Install and maintain poles, structures and hardware
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

Elective units

AVIW0006	Perform infrastructure inspections using remote operated systems
UETDREL003	Identify and apply controls for alternate supplies on the distribution network
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UEEEL0020 Solve problems in low voltage a.c. circuits
	∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
	∟ UETDRIS018 Perform low voltage field switching operation to a given schedule
UETDRIS003	Develop high voltage switching schedule
	Common Unit Group
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry

components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS017 Perform high voltage field switching operation to a given schedule

Transmission Overhead Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRTO006 Install and maintain transmission conductors

∟UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

∟UETDRDO005 Maintain overhead energised low voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

∟UETTDRIS67 Solve problems in energy supply network equipment

UETDRIS004 Develop low voltage switching schedule

Common Unit Group

∟UEENEEE101A Apply Occupational Health and Safety regulations, codes

and practices in the workplace

∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS018 Perform low voltage field switching operation to a given schedule

Transmission Overhead Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRTO006 Install and maintain transmission conductors

∟UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

∟UETDRDO005 Maintain overhead energised low voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

∟UETTDRIS67 Solve problems in energy supply network equipment

UETDRIS011 Install and maintain low voltage underground services

∟UEECD0007 Apply work health and safety regulations, codes and

practices in the workplace

∟UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟UEECD0044 Solve problems in multiple path circuits

∟UEECD0046 Solve problems in single path circuits

∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟UEEEL0020 Solve problems in low voltage a.c. circuits

∟UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟UETDREL001 Apply environmental requirements

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS013 Install and maintain public lighting systems

∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟UEECD0044 Solve problems in multiple path circuits

∟UEECD0046 Solve problems in single path circuits

∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟UEEEL0020 Solve problems in low voltage a.c. circuits

∟UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟UETDRDO005 Maintain overhead energised low voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

UETDRIS014 Install and replace energy meters and associated equipment

∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

UETDRIS015 Install low voltage mobile generator

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS017 Perform high voltage field switching operation to a given schedule

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS018 Perform low voltage field switching operations to a given schedule

UETDRIS018	Perform low voltage field switching operation to a given schedule
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UEEEL0020 Solve problems in low voltage a.c. circuits
	∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRSB001	Perform substation switching operations to a given schedule
UETDRVC003	Control vegetation for powerline work
	∟ AHCMOM213 Operate and maintain chainsaws
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

Qualification Mapping Information

This qualification replaces and is equivalent to UET30619 Certificate III in ESI - Power Systems - Distribution Overhead

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET30721 Certificate III in ESI - Rail Traction

Modification History

Release 2. Updated superseded TLI elective units.

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work in the electrical supply industry (ESI) as a Rail Traction Lineworker.

This qualification covers the installation, maintenance and inspection of overhead poles/structures, conductors, cables and rail traction wiring systems, including associated equipment used in the rail traction industry. It also includes the maintenance of bonds and the operation of rail traction height access equipment.

The application of the skills and knowledge described within the units in this qualification may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **28 units** of competency comprising:

- **26 core units** listed below; plus
- **2 elective units** from the elective units listed below, of which, 1 elective unit may be selected, with appropriate contextualisation, from a qualification in this or any other endorsed Training Package, provided the selected unit contributes to the vocational outcome of the qualification.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with. Prerequisites attached to any of the units must be obtained and are additional to the number of units required for the qualification.

Where a prerequisite is attached to a unit it is identified by the symbol ∟.

Core units

AHCMOM213 Operate and maintain chainsaws

CPCCLDG3001	Licence to perform dogging
CPCCLRG3001	Licence to perform rigging basic level ∟ CPCCLDG3001 Licence to perform dogging
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEECD0044	Solve problems in multiple path circuits ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟ UEECD0046 Solve problems in single path circuits
UEECD0046	Solve problems in single path circuits ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEEEL0020	Solve problems in low voltage a.c. circuits ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices and ∟ UEECD0043 Solve problems in direct current circuits or ∟ UEECD0044 Solve problems in multiple path circuits ∟ UEECD0046 Solve problems in single path circuits
UEEEL0021	Solve problems in magnetic and electromagnetic devices ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace and

∟ UEECD0043 Solve problems in direct current circuits

or

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS012 Install and maintain poles, structures and hardware

UETDRIS012 Install and maintain poles, structures and hardware

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRT001 Install overhead rail traction configurations

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

∟ UETDRRT002 Install overhead traction components and equipment

∟ UETDRRT004 Install traction overhead wiring systems

UETDRRT002 Install overhead traction components and equipment

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT003 Install rail traction bonds

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

∟ UETDRRT002 Install overhead traction components and equipment

∟ UETDRRT004 Install traction overhead wiring systems

UETDRRT004 Install traction overhead wiring systems

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

∟ UETDRRT002 Install overhead traction components and equipment

UETDRRT008 Maintain overhead rail traction configurations

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

∟ UETDRRT001 Install overhead rail traction configurations

∟ UETDRRT002 Install overhead traction components and equipment

∟ UETDRRT004 Install traction overhead wiring systems

∟ UETDRRT009 Maintain overhead traction components and equipment

∟ UETDRRT011 Maintain traction overhead wiring systems

UETDRRT009 Maintain overhead traction components and equipment

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

∟ UETDRRT002 Install overhead traction components and equipment

UETDRRT010 Maintain rail traction bonds

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

∟ UETDRRT002 Install overhead traction components and equipment

∟ UETDRRT003 Install rail traction bonds

∟ UETDRRT004 Install traction overhead wiring systems

∟ UETDRRT009 Maintain overhead traction components and equipment

∟ UETDRRT011 Maintain traction overhead wiring systems

UETDRRT011 Maintain traction overhead wiring systems

∟ UEECD0007 Apply work health and safety regulations, codes and

practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

∟ UETDRRT002 Install overhead traction components and equipment

∟ UETDRRT004 Install traction overhead wiring systems

UETDRRT012 Operate rail road height access plant near rail traction systems

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRT014 Test and verify rail traction installations

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

∟ UETDRRT001 Install overhead rail traction configurations

∟ UETDRRT002 Install overhead traction components and equipment

∟ UETDRRT003 Install rail traction bonds

∟ UETDRRT004 Install traction overhead wiring systems

∟ UETDRRT008 Maintain overhead rail traction configurations

∟ UETDRRT009 Maintain overhead traction components and equipment

∟ UETDRRT010 Maintain rail traction bonds

∟ UETDRRT011 Maintain traction overhead wiring systems

∟ UETDRRT012 Operate rail road height access plant near rail traction systems

Group A

CPCCLRG3002 Licence to perform rigging intermediate level

∟ CPCCLRG3001 Licence to perform rigging basic level

TLILIC0003 Licence to operate a forklift truck

TLILIC0022 Licence to operate a slewing mobile crane (up to 20 tonnes)

TLILIC0024 Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)

TLILIC2015 Licence to drive a medium rigid vehicle

TLILIC2016 Licence to drive a heavy rigid vehicle

UETDRAI001 Inspect and test poles at and below ground level

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

∟ UETDREL002 Comply with environmental requirements

∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

	or
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRAI004	Treat poles
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UETDREL002 Comply with environmental requirements
	∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker
UETDRDO001	Inspect overhead poles, structures and electrical apparatus
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRDO005	Maintain overhead energised low voltage distribution network
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components
	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UEEEL0020 Solve problems in low voltage a.c. circuits
	∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
	∟ UETDRIS007 Install and maintain distribution overhead conductors and cables
	∟ UETDRIS012 Install and maintain poles, structures and hardware
UETDRIS008	Install and maintain electrical apparatus

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

and

∟ UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟ UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

or

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT013 Perform rail traction switching operations to a given schedule

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live

	electrical apparatus
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
	∟ UETDRIS007 Install and maintain distribution overhead conductors and cables
	∟ UETDRIS012 Install and maintain poles, structures and hardware
	∟ UETDRRT001 Install overhead rail traction configurations
	∟ UETDRRT002 Install overhead traction components and equipment
	∟ UETDRRT004 Install traction overhead wiring systems
UETDRSB001	Perform substation switching operations to a given schedule
UETDRVC003	Control vegetation for powerline work
	∟ AHCMOM213 Operate and maintain chainsaws
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

Qualification Mapping Information

This qualification replaces and is not equivalent to UET30719 Certificate III in ESI – Power Systems – Rail Traction

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET30821 Certificate III in ESI - Distribution Underground

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a Distribution Underground Cable Jointer.

This qualification covers the installation and maintenance of low voltage (LV) and high voltage (HV) underground cables, services and electrical equipment.

The application of the skills and knowledge described within the units in this qualification may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **23 units** comprising:

- **18 core units** listed below; plus
- **5 elective units**

The elective units are to be chosen as follows:

- **3 elective units** selected from Group A listed below
- **2 elective units** may be selected from Group A or Group B elective units listed below, of which, 1 elective unit may be selected, with appropriate contextualisation, from a qualification in this or any other endorsed Training Package, provided the selected unit contributes to the vocational outcome of the qualification.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with. Prerequisites attached to any of the units must be obtained and are additional to the number of units required for the qualification.

Where a prerequisite is attached to a unit it is identified by the symbol ∟.

Core units

CPCCLDG3001	Licence to perform dogging
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEECD0044	Solve problems in multiple path circuits ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟ UEECD0046 Solve problems in single path circuits
UEECD0046	Solve problems in single path circuits ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEEEL0020	Solve problems in low voltage a.c. circuits ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices and ∟ UEECD0043 Solve problems in direct current circuits or ∟ UEECD0044 Solve problems in multiple path circuits ∟ UEECD0046 Solve problems in single path circuits
UEEEL0021	Solve problems in magnetic and electromagnetic devices ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace and ∟ UEECD0043 Solve problems in direct current circuits or

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

UETDRDU002 Inspect underground electrical apparatus

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

∟ UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

or

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRDU009 Install, test and verify distribution underground cable installations

∟ CPCCLDG3001 Licence to perform dogging

∟ TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDRDU002 Inspect underground electrical apparatus

∟ UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟ UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS008 Install and maintain electrical apparatus

∟ UETDRIS011 Install and maintain low voltage underground services

UETDRDU013	Joint, terminate and maintain high voltage underground polymeric cable
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components
	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UEEEL0020 Solve problems in low voltage a.c. circuits
	∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRDU015	Joint, terminate and maintain low voltage underground polymeric cable
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components
	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UEEEL0020 Solve problems in low voltage a.c. circuits
	∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDREL001	Apply environmental requirements
UETDREL004	Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UETDREL005	Work safely in the vicinity of live electrical apparatus
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UETDRIS008	Install and maintain electrical apparatus

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

and

∟ UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟ UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

or

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

UETDRIS011 Install and maintain low voltage underground services

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

Group A

UETDRDU007	Install and maintain underground public lighting
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components
	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UEEEL0020 Solve problems in low voltage a.c. circuits
	∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRDU010	Joint, terminate and maintain energised low voltage underground paper insulated cable
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components
	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UEEEL0020 Solve problems in low voltage a.c. circuits
	∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices
	∟ UETDRDU014 Joint, terminate and maintain low voltage underground paper insulated cable
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRDU011	Joint, terminate and maintain energised low voltage underground polymeric cable
	∟ UEECD0007 Apply work health and safety regulations, codes and

practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRDU014 Joint, terminate and maintain low voltage underground paper insulated cable

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRDU016 Lay power cables

UETDRDU019 Transition joint high voltage paper insulated cable to high voltage polymeric cable

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

Group B

UETDRDU001 Conduct high voltage testing of underground power cable system

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRDU017 Locate faults in underground power cables

∟ UEECD0007 Apply work health and safety regulations, codes and

practices in the workplace

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDREL003 Identify and apply controls for alternate supplies on the distribution network

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS018 Perform low voltage field switching operation to a given schedule

UETDRIS003 Develop high voltage switching schedule

Common Unit Group

∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟ UEENEEE104A Solve problems in d.c. circuits

∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟ UEENEEG102A Solve problems in low voltage a.c. circuits

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS017 Perform high voltage field switching operation to a given schedule

Transmission Overhead Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRTO006 Install and maintain transmission conductors

∟UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

∟UETDRDO005 Maintain overhead energised low voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

∟UETTDRIS67 Solve problems in energy supply network equipment

UETDRIS004 Develop low voltage switching schedule

Common Unit Group

∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS018 Perform low voltage field switching operation to a given

schedule

Transmission Overhead Pathway Group

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRTO006 Install and maintain transmission conductors

∟ UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

∟ UETDRDO005 Maintain overhead energised low voltage distribution network

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS008 Install and maintain electrical apparatus

∟ UETDRIS010 Install and maintain low voltage overhead services

∟ UETDRIS012 Install and maintain poles, structures and hardware

Rail Traction Pathway Group

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDRIS007 Install and maintain distribution overhead conductors and cables

∟ UETDRIS012 Install and maintain poles, structures and hardware

∟ UETDRRT002 Install overhead traction components and equipment

∟ UETDRRT003 Install rail traction bonds

∟ UETDRRT004 Install traction overhead wiring systems

∟ UETDRRT009 Maintain overhead traction components and equipment

∟ UETDRRT011 Maintain traction overhead wiring systems

Distribution Cable Jointing Pathway Group

∟ UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟ UETDRDU015 Joint, terminate and maintain low voltage underground

polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

∟UETTDRIS67 Solve problems in energy supply network equipment

UETDRIS014 Install and replace energy meters and associated equipment

∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟UEECD0044 Solve problems in multiple path circuits

∟UEECD0046 Solve problems in single path circuits

∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟UEEEL0020 Solve problems in low voltage a.c. circuits

∟UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟UETDREL001 Apply environmental requirements

UETDRIS015 Install low voltage mobile generator

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS017 Perform high voltage field switching operation to a given schedule

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRIS018 Perform low voltage field switching operation to a given schedule

UETDRIS018 Perform low voltage field switching operation to a given schedule

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEEEL0020 Solve problems in low voltage a.c. circuits

∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRSB001 Perform substation switching operations to a given schedule

Qualification Mapping Information

This qualification replaces and is equivalent to UET30819 Certificate III in ESI - Power Systems - Distribution Cable Jointing

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET30921 Certificate III in ESI - Very Remote Community Utilities

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Training Package Release 2.0.

Qualification Description

This qualification provides the skill and knowledge to work on very remote community utility systems as a remote community utilities worker in the electricity supply industry (ESI).

The qualification covers the skills and knowledge to operate, monitor and maintain generation power systems, distribution electrical network circuits and apparatus, and specialisations in power and water systems.

Combined Specialist – Power and Water Systems

This combined specialisation covers the skills and knowledge required to work on very remote community utility power and water systems.

Specialist – Power Systems

This specialisation covers the skills and knowledge required to install, operate, monitor and maintain distribution overhead and underground networks and customer connections. It also includes the skills and knowledge required to monitor and maintain renewable energy systems.

Specialist – Water Systems

This specialisation covers the skills and knowledge required to install, operate, monitor and maintain water systems.

All work on power systems will be undertaken on isolated assets other than for testing purposes.

The use of support plant and equipment to perform these tasks and environmental requirements also play a part in this qualification.

Please note: RTO to insert on the testamur, the specialisation selected from the specialist elective unit group below.

Very Remote Communities: means a community with restricted access and very little accessibility of goods, services and opportunities for social interaction. Supporting information on the classification of a very remote community can be defined using the latest version of Accessibility/Remoteness Index of Australia (ARIA) (excluding mine sites).

Isolated: Means disconnected from all possible sources of electricity supply by means that prevent unintentional energisation of the apparatus and that are assessed as a suitable step in the process of making safe for access purposes. That is for high voltage (HV) (short-circuited and earthed) and for low voltage (LV) (short-circuited to the neutral).

The application of the skills and knowledge described within the units in this qualification may

require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **24 units** comprising:

Combined Specialisation - Power and Water Systems

- **17 core units** listed below, plus
- **7 elective units** from a combination of Group A and Group B below.

Specialisation – Power Systems

- **17 core units** listed below, plus
- **7 elective units** from Group A listed below.

Specialisation– Water Systems

- **17 core units** listed below, plus
- **7 elective units** from Group B listed below.

Up to 1 elective unit may be selected, with appropriate contextualisation, from a qualification in this or any endorsed Training Package, provided the selected unit contributes to the vocational outcome of the qualification.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with. Prerequisites attached to any of the units must be obtained and are additional to the number of units required for the qualification.

Where a prerequisite is attached to a unit it is identified by the symbol ∟.

Core units

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEECD0044	Solve problems in multiple path circuits ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0046 Solve problems in single path circuits

UEECD0046 Solve problems in single path circuits

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERE0007 Conduct periodic maintenance of remote area power supply generator sets

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEERE0019 Maintain safety and tidiness of remote area power supply systems

∟ UEERE0023 Work safely with remote area power supply systems

and

∟ UEECD0043 Solve problems in direct current circuits

or

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

UEERE0018 Maintain and repair remote area power generation facilities

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEERE0007 Conduct periodic maintenance of remote area power supply generator sets

∟ UEERE0019 Maintain safety and tidiness of remote area power supply systems

∟ UEERE0023 Work safely with remote area power supply systems

and

	∟ UEECD0043 Solve problems in direct current circuits
	or
	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
UEERE0019	Maintain safety and tidiness of remote area power supply systems
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEERE0023 Work safely with remote area power supply systems
UEERE0023	Work safely with remote area power supply systems
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEERE0041	Maintain operation of remote area power generation plant
	∟ UEERE0018 Maintain and repair remote area power generation facilities
UETDREL001	Apply environmental requirements
UETDREL004	Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UETDREL005	Work safely in the vicinity of live electrical apparatus
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UETDRRC005	Maintain, test and verify power systems in a very remote community
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components
	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UEERE0007 Conduct periodic maintenance of remote area power supply generator sets
	∟ UEERE0018 Maintain and repair remote area power generation facilities
	∟ UEERE0019 Maintain safety and tidiness of remote area power supply systems

∟ UEERE0023 Work safely with remote area power supply systems

∟ UEERE0041 Maintain operation of remote area power generation plant

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRRC006 Perform low voltage electricity network switching in a very remote community

∟ UETDRRC007 Solve problems in electrical network apparatus in a very remote community

∟ UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

UETDRRC006 Perform low voltage electricity network switching in a very remote community

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRC007 Solve problems in electrical network apparatus in a very remote community

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRRC006 Perform low voltage electricity network switching in a very remote community

UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

∟ UEECD0007 Apply work health and safety regulations, codes and

practices in the workplace

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRRC006 Perform low voltage electricity network switching in a very remote community

∟ UETDRRC007 Solve problems in electrical network apparatus in a very remote community

Group A: Power Systems

UEERE0006 Conduct periodic maintenance of remote area power supply battery banks

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEERE0019 Maintain safety and tidiness of remote area power supply systems

∟ UEERE0023Work safely with remote area power supply systems

and

∟ UEECD0043 Solve problems in direct current circuits

or

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

UEERE0008 Conduct periodic maintenance of remote area power supply photovoltaic arrays

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEERE0019 Maintain safety and tidiness of remote area power supply systems

∟ UEERE0023Work safely with remote area power supply systems

and

∟ UEECD0043 Solve problems in direct current circuits

or

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

UEERE0009 Conduct periodic maintenance of remote area power supply wind generators

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UEERE0019 Maintain safety and tidiness of remote area power supply systems

∟ UEERE0023Work safely with remote area power supply systems

and

∟ UEECD0043 Solve problems in direct current circuits

or

∟ UEECD0044 Solve problems in multiple path circuits

∟ UEECD0046 Solve problems in single path circuits

UETDRDO001 Inspect overhead poles, structures and electrical apparatus

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UEEEL0020 Solve problems in low voltage a.c. circuits
	∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRDU015	Joint, terminate and maintain low voltage underground polymeric cable
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components
	∟ UEECD0044 Solve problems in multiple path circuits
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UEEEL0020 Solve problems in low voltage a.c. circuits
	∟ UEEEL0021 Solve problems in magnetic and electromagnetic devices
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRDU016	Lay power cables
UETDRIS007	Install and maintain distribution overhead conductors and cables
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
	∟ UETDRIS012 Install and maintain poles, structures and hardware

UETDRIS012	Install and maintain poles, structures and hardware
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
UETDRRC001	Install and maintain low voltage overhead services in a very remote community
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus
	∟ UETDRRC006 Perform low voltage electricity network switching in a very remote community
	∟ UETDRRC007 Solve problems in electrical network apparatus in a very remote community
	∟ UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community
UETDRRC002	Install and maintain low voltage underground services in a very remote community
	∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
	∟ UEECD0046 Solve problems in single path circuits
	∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
	∟ UETDREL001 Apply environmental requirements
	∟ UETDREL004 Operate plant and equipment in the vicinity of live

electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRRC006 Perform low voltage electricity network switching in a very remote community

∟ UETDRRC007 Solve problems in electrical network apparatus in a very remote community

∟ UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

UETDRRC003 Install and maintain public lighting systems in a very remote community

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0019 Fabricate, assemble and dismantle utilities industry components

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟ UETDRRC006 Perform low voltage electricity network switching in a very remote community

∟ UETDRRC007 Solve problems in electrical network apparatus in a very remote community

∟ UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

UETDRRC004 Install and replace energy meters and associated equipment in a very remote community

∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

∟ UEECD0046 Solve problems in single path circuits

∟ UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

∟ UETDREL001 Apply environmental requirements

∟ UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟ UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRRC006 Perform low voltage electricity network switching in a very remote community

∟UETDRRC007 Solve problems in electrical network apparatus in a very remote community

∟UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

Group B: Water Systems

NWPCAD004	Maintain catchment and surrounding areas
NWPCAD019	Monitor and operate groundwater extraction
NWPGEN017	Apply the risk management principles of the water industry standards, guidelines and legislation
NWPGEN020	Sample and test source or drinking water
NWPGEN021	Sample and test wastewater
NWPGEN023	Use maps, plans, drawings and details
NWPGEN027	Monitor and operate pump stations
NWPNET020	Control electrical risk on metallic pipes
NWPNET036	Perform leak detection
NWPNET038	Install metering equipment
NWPNET039	Maintain and repair network assets for drinking water
NWPNET040	Maintain and repair network assets for wastewater
NWPTRT005	Monitor and operate water treatment processes
NWPTRT027	Monitor and operate wastewater treatment processes

Qualification Mapping Information

This qualification replaces and is equivalent to UET30919 Certificate III in ESI - Remote Community Utilities Worker

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET40421 Certificate IV in ESI - Network Systems

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work on network systems in the electricity supply industry (ESI).

This qualification covers work on the network systems in the specific fields of live line transmission, live line distribution, live line rail traction and/or installation and maintenance of specialised underground cables. These roles may lead or supervise work teams and work in transmission, distribution, rail or cable jointing.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1280 weighting points** comprising:

540 core weighting points listed below; **plus**

740 general elective weighting points from the general elective units listed below.

Choose a total of 740 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; between 0 and 420 **weighting points** can be taken from Group B; and between 320 and 740 **weighting points** taken from Group C. You may select all your electives from this group.

Up to 60 weighting points of the general elective units Group A may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure all prerequisite units specified

are complied with.

Core units		Weighting Points
CPCCLDG3001	Licence to perform dogging	20
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE105A	Fix and secure electrotechnology equipment ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	80
UETDREL001	Apply environmental requirements	20

UETDREL004	Operate plant and equipment in the vicinity of live electrical apparatus ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	40
UETDREL005	Work safely in the vicinity of live electrical apparatus ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	20
UETDRIS005	Implement & monitor power system environmental & sustainable energy management policies & procedures Electrotechnology Pathway Unit Group ∟ UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ESI - TDR Pathway Unit Group ∟ UETDREL001 Apply environmental requirements	30
UETDRIS006	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	30

Group A: Imported and common elective units		**Weighting Points**
AHCMOM213	Operate and maintain chainsaws	20
BSBINS402	Coordinate workplace information systems	40
BSBLDR413	Lead effective workplace relationships	50
BSBLDR414	Lead team effectiveness	50
BSBOPS402	Coordinate business operational plans	40
BSBSTR402	Implement continuous improvement	40
CPCCLRG3001	Licence to perform rigging basic level ∟ CPCCLDG3001 Licence to perform dogging	40

Group B: Qualification elective units	**Weighting Points**

UETDRDO001	Inspect overhead poles, structures and electrical apparatus	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRDO005	Maintain overhead energised low voltage distribution network	60
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
UETDRDO006	Maintain, test and verify distribution overhead network	40
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	

	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDRDO001 Inspect overhead poles, structures and electrical apparatus	
	∟UETDRDO005 Maintain overhead energised low voltage distribution network	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS008 Install and maintain electrical apparatus	
	∟UETDRIS010 Install and maintain low voltage overhead services	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
UETDRDU001	Conduct high voltage testing of underground power cable system	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	

UETDRDU009	Install, test and verify distribution underground cable installations	40
	∟CPCCLDG3001 Licence to perform dogging	
	∟TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDRDU002 Inspect underground electrical apparatus	
	∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable	
	∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS008 Install and maintain electrical apparatus	
	∟UETDRIS011 Install and maintain low voltage underground services	
UETDRDU010	Joint, terminate and maintain energised low voltage underground paper insulated cable	60
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	

	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDRDU014 Joint, terminate and maintain low voltage underground paper insulated cable	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRDU011	Joint, terminate and maintain energised low voltage underground polymeric cable	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRDU012	Joint, terminate and maintain high voltage underground paper insulated cable	60
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	

	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRDU013	Joint, terminate and maintain high voltage underground polymeric cable	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRDU014	Joint, terminate and maintain low voltage underground paper insulated cable	40
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules,	

	standards, codes and specifications ∟UEEEL0020 Solve problems in low voltage a.c. circuits ∟UEEEL0021 Solve problems in magnetic and electromagnetic devices ∟UETDREL001 Apply environmental requirements ∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRDU015	Joint, terminate and maintain low voltage underground polymeric cable ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟UEECD0019 Fabricate, assemble and dismantle utilities industry components ∟UEECD0044 Solve problems in multiple path circuits ∟UEECD0046 Solve problems in single path circuits ∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications ∟UEEEL0020 Solve problems in low voltage a.c. circuits ∟UEEEL0021 Solve problems in magnetic and electromagnetic devices ∟UETDREL001 Apply environmental requirements ∟UETDREL005 Work safely in the vicinity of live electrical apparatus	50
UETDRDU016	Lay power cables	20
UETDRDU017	Locate faults in underground power cables ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟UEECD0044 Solve problems in multiple path circuits ∟UEECD0046 Solve problems in single path circuits ∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications ∟UEEEL0020 Solve problems in low voltage a.c. circuits ∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	60

	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRDU019	Transition joint high voltage paper insulated cable to high voltage polymeric cable	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRIS007	Install and maintain distribution overhead conductors and cables	60
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
UETDRIS008	Install and maintain electrical apparatus	60
	∟UEECD0007 Apply work health and safety	

	regulations, codes and practices in the workplace ∟UEECD0019 Fabricate, assemble and dismantle utilities industry components ∟UEECD0044 Solve problems in multiple path circuits ∟UEECD0046 Solve problems in single path circuits ∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications ∟UEEEL0020 Solve problems in low voltage a.c. circuits ∟UEEEL0021 Solve problems in magnetic and electromagnetic devices ∟UETDREL001 Apply environmental requirements ∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus ∟UETDREL005 Work safely in the vicinity of live electrical apparatus and ∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable ∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable or ∟UETDRIS007 Install and maintain distribution overhead conductors and cables ∟UETDRIS012 Install and maintain poles, structures and hardware	
UETDRIS010	Install and maintain low voltage overhead services ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟UEECD0019 Fabricate, assemble and dismantle utilities industry components ∟UEECD0044 Solve problems in multiple path circuits ∟UEECD0046 Solve problems in single path circuits ∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications ∟UEEEL0020 Solve problems in low voltage a.c. circuits ∟UEEEL0021 Solve problems in magnetic and	40

	electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRIS011	Install and maintain low voltage underground services	40
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRIS012	Install and maintain poles, structures and hardware	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRIS014	Install and replace energy meters and associated equipment	50
	∟UEECD0007 Apply work health and safety	

	regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
UETDRIS015	Install low voltage mobile generator	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRIS017	Perform high voltage field switching operation to a given schedule	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and	

	electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS018 Perform low voltage field switching operation to a given schedule	
UETDRRT001	Install overhead rail traction configurations	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
	∟UETDRRT002 Install overhead traction components and equipment	
	∟UETDRRT004 Install traction overhead wiring systems	
UETDRRT002	Install overhead traction components and equipment	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle	

	utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
UETDRRT003	Install rail traction bonds	40
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	

	∟UETDRIS012 Install and maintain poles, structures and hardware	
	∟UETDRRT002 Install overhead traction components and equipment	
	∟UETDRRT004 Install traction overhead wiring systems	
UETDRRT004	Install traction overhead wiring systems	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
	∟UETDRRT002 Install overhead traction components and equipment	
UETDRRT008	Maintain overhead rail traction configurations	60
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules,	

	standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRRT001 Install overhead rail traction configurations	
	∟UETDRRT002 Install overhead traction components and equipment	
	∟UETDRRT004 Install traction overhead wiring systems	
	∟UETDRRT009 Maintain overhead traction components and equipment	
	∟UETDRRT011 Maintain traction overhead wiring systems	
UETDRRT009	Maintain overhead traction components and equipment	60
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	

	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
	∟UETDRRT002 Install overhead traction components and equipment	
UETDRRT010	Maintain rail traction bonds	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
	∟UETDRRT002 Install overhead traction components and equipment	
	∟UETDRRT003 Install rail traction bonds	
	∟UETDRRT004 Install traction overhead wiring systems	
	∟UETDRRT009 Maintain overhead traction	

	components and equipment ∟UETDRRT011 Maintain traction overhead wiring systems	
UETDRRT011	Maintain traction overhead wiring systems ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟UEECD0019 Fabricate, assemble and dismantle utilities industry components ∟UEECD0044 Solve problems in multiple path circuits ∟UEECD0046 Solve problems in single path circuits ∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications ∟UEEEL0020 Solve problems in low voltage a.c. circuits ∟UEEEL0021 Solve problems in magnetic and electromagnetic devices ∟UETDREL001 Apply environmental requirements ∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus ∟UETDREL005 Work safely in the vicinity of live electrical apparatus ∟UETDRIS007 Install and maintain distribution overhead conductors and cables ∟UETDRIS012 Install and maintain poles, structures and hardware ∟UETDRRT002 Install overhead traction components and equipment ∟UETDRRT004 Install traction overhead wiring systems	60
UETDRRT012	Operate rail road height access plant near rail traction systems ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟UETDREL001 Apply environmental requirements ∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus ∟UETDREL005 Work safely in the vicinity of live electrical apparatus	20

UETDRRT013	Perform rail traction switching operations to a given schedule	50
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
	∟UETDRRT001 Install overhead rail traction configurations	
	∟UETDRRT002 Install overhead traction components and equipment	
	∟UETDRRT004 Install traction overhead wiring systems	
UETDRRT014	Test and verify rail traction installations	40
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	

	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
	∟UETDRRT001 Install overhead rail traction configurations	
	∟UETDRRT002 Install overhead traction components and equipment	
	∟UETDRRT003 Install rail traction bonds	
	∟UETDRRT004 Install traction overhead wiring systems	
	∟UETDRRT008 Maintain overhead rail traction configurations	
	∟UETDRRT009 Maintain overhead traction components and equipment	
	∟UETDRRT010 Maintain rail traction bonds	
	∟UETDRRT011 Maintain traction overhead wiring systems	
	∟UETDRRT012 Operate rail road height access plant near rail traction systems	
UETDRSB001	Perform substation switching operations to a given schedule	50
UETDRTO004	Inspect and maintain transmission overhead network	40
	∟CPCCLDG3001 Licence to perform dogging	
	∟CPCCLRG3001 Licence to perform rigging basic level	
	∟TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	

	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0044 Solve problems in multiple path circuits	
	∟UEECD0046 Solve problems in single path circuits	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEEEL0020 Solve problems in low voltage a.c. circuits	
	∟UEEEL0021 Solve problems in magnetic and electromagnetic devices	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRTO005 Inspect transmission structures, conductors and hardware	
	∟UETDRTO006 Install and maintain transmission conductors	
	∟UETDRTO007 Install and maintain transmission structures and hardware	
UETDRTO005	Inspect transmission structures, conductors and hardware	40
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRTO006	Install and maintain transmission conductors	60
	∟CPCCLRG3001 Licence to perform rigging basic level	
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	

	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRTO007 Install and maintain transmission structures and hardware	
UETDRTO007	Install and maintain transmission structures and hardware	60
	∟CPCCLRG3001 Licence to perform rigging basic level	
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UEECD0019 Fabricate, assemble and dismantle utilities industry components	
	∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRVC003	Control vegetation for powerline work	40
	∟AHCMOM213 Operate and maintain chainsaws	
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	

Group C: Qualification elective units		**Weighting Points**
UETDRDO003	Maintain energised high voltage distribution overhead electrical apparatus (glove and barrier)	70
UETDRDO004	Maintain energised high voltage distribution overhead electrical apparatus (stick)	70

UETDRDS008	Draft and layout a power system distribution substation minor upgrade	60
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS009	Draft and layout a power system overhead distribution extension	60
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system	

	environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS010	Draft and layout a power system street lighting system	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS011	Draft and layout a power system underground distribution extension	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	

	∟UETDREL001 Apply environmental requirements ∟UETDREL005 Work safely in the vicinity of live electrical apparatus ∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDU003	Install and maintain gas and oil pressure systems for specialised underground cables ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UETDRDU009 Install, test and verify distribution underground cable installations ∟UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable ∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable ∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable ∟UETDRDU016 Lay power cables ∟UETDREL001 Apply environmental requirements ∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus ∟UETDREL005 Work safely in the vicinity of live electrical apparatus ∟UETDRIS008 Install and maintain electrical apparatus	65

	∟UETDRIS011 Install and maintain low voltage underground services	
UETDRDU006	Install and maintain polymeric specialised underground cables	65
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDRDU009 Install, test and verify distribution underground cable installations	
	∟UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable	
	∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable	
	∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable	
	∟UETDRDU016 Lay power cables	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS008 Install and maintain electrical apparatus	
	∟UETDRIS011 Install and maintain low voltage underground services	
UETDRDU008	Install gas and oil filled specialised underground cables	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle	

	utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UETDRDU009 Install, test and verify distribution underground cable installations ∟UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable ∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable ∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable ∟UETDRDU016 Lay power cables ∟UETDREL001 Apply environmental requirements ∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus ∟UETDREL005 Work safely in the vicinity of live electrical apparatus ∟UETDRIS008 Install and maintain electrical apparatus ∟UETDRIS011 Install and maintain low voltage underground services	
UETDRDU018	Maintain gas and oil filled specialised underground cables ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	60

	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDRDU008 Install gas and oil filled specialised underground cables	
	∟UETDRDU009 Install, test and verify distribution underground cable installations	
	∟UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable	
	∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable	
	∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable	
	∟UETDRDU016 Lay power cables	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS008 Install and maintain electrical apparatus	
	∟UETDRIS011 Install and maintain low voltage underground services	
UETDRIS001	Coordinate and direct power system switching schedules	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

Transmission Overhead Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS017 Perform high voltage field switching operation to a given schedule

∟UETDRTO006 Install and maintain transmission conductors

∟UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

∟UETDRDO005 Maintain overhead energised low voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRIS018 Perform low voltage field switching operation to a given schedule

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components

and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

∟UETDRRT013 Perform rail traction switching operations to a given schedule

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

∟UETDRIS018 Perform low voltage field switching operation to a given schedule

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical

	control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
	∟UETDRSB001 Perform substation switching operations to a given schedule	
UETDRIS002	Coordinate power system permit procedures	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	Transmission Overhead Pathway Group	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS017 Perform high voltage field switching operation to a given schedule	
	∟UETDRTO006 Install and maintain transmission conductors	
	∟UETDRTO007 Install and maintain transmission structures and hardware	
	Distribution Overhead Pathway Group	
	∟UETDRDO005 Maintain overhead energised low	

voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRIS018 Perform low voltage field switching operation to a given schedule

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

∟UETDRRT013 Perform rail traction switching operations to a given schedule

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDRIS008 Install and maintain electrical apparatus	
	∟UETDRIS011 Install and maintain low voltage underground services	
	∟UETDRIS018 Perform low voltage field switching operation to a given schedule	
	Electrical Pathway Group	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
	∟UETDRSB001 Perform substation switching operations to a given schedule	
UETDRIS003	Develop high voltage switching schedule	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules,	

standards, codes and specifications

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS017 Perform high voltage field switching operation to a given schedule

Transmission Overhead Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRTO006 Install and maintain transmission conductors

∟UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

∟UETDRDO005 Maintain overhead energised low voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETDRIS004	Develop low voltage switching schedule	90
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS018 Perform low voltage field switching operation to a given schedule	
	Transmission Overhead Pathway Group	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRTO006 Install and maintain transmission conductors	
	∟UETDRTO007 Install and maintain transmission structures and hardware	
	Distribution Overhead Pathway Group	
	∟UETDRDO005 Maintain overhead energised low voltage distribution network	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution	

overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology

	work ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits ∟UEENEEG109A Develop and connect electrical control circuits ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ∟UETTDRIS67 Solve problems in energy supply network equipment	
UETDRIS016	Install mobile generation set for synchronised HV Genset Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UETDREL005 Work safely in the vicinity of live electrical apparatus Transmission Overhead Pathway Group ∟UETDREL001 Apply environmental requirements ∟UETDREL004 Operate plant and equipment in the	40

vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS017 Perform high voltage field switching operation to a given schedule

∟UETDRTO006 Install and maintain transmission conductors

∟UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

∟UETDRDO005 Maintain overhead energised low voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRIS018 Perform low voltage field switching operation to a given schedule

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction

components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

∟UETDRRT013 Perform rail traction switching operations to a given schedule

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

∟UETDRIS018 Perform low voltage field switching operation to a given schedule

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

∟UETTDRIS67 Solve problems in energy supply network equipment

	∟UETDRSB001 Perform substation switching operations to a given schedule	
UETDRRT005	Maintain energised d.c. traction overhead wiring system	60
	Pathway 1	
	Qualified and Authorised Rail Traction Line Worker	
	Pathway 2	
	∟BSBLDR414 Lead team effectiveness	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
	∟UETDRRT001 Install overhead rail traction configurations	
	∟UETDRRT002 Install overhead traction components and equipment	
	∟UETDRRT003 Install rail traction bonds	
	∟UETDRRT004 Install traction overhead wiring systems	
	∟UETDRRT008 Maintain overhead rail traction configurations	

	∟UETDRRT009 Maintain overhead traction components and equipment	
	∟UETDRRT011 Maintain traction overhead wiring systems	
	∟UETDRRT012 Operate rail road height access plant near rail traction systems	
	∟UETDRRT014 Test and verify rail traction installations	
	∟UETTDRIS65 Contribute to coordinated HV live working	
UETDRRT006	Maintain energised traction overhead electrical apparatus using glove techniques	70
	Pathway 1	
	Qualified and Authorised Rail Traction Lineworker	
	Pathway 2	
	∟BSBLDR414 Lead team effectiveness	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	

	∟UETDRRT001 Install overhead rail traction configurations	
	∟UETDRRT002 Install overhead traction components and equipment	
	∟UETDRRT003 Install rail traction bonds	
	∟UETDRRT004 Install traction overhead wiring systems	
	∟UETDRRT005 Maintain energised d.c. traction overhead wiring system	
	∟UETDRRT008 Maintain overhead rail traction configurations	
	∟UETDRRT009 Maintain overhead traction components and equipment	
	∟UETDRRT011 Maintain traction overhead wiring systems	
	∟UETDRRT012 Operate rail road height access plant near rail traction systems	
	∟UETDRRT014 Test and verify rail traction installations	
	∟UETTDRIS65 Contribute to coordinated HV live working	
UETDRRT007	Maintain energised traction overhead electrical apparatus using stick techniques	70
	Pathway 1	
	Qualified and Authorised Rail Traction Line Worker	
	Pathway 2	
	∟BSBLDR414 Lead team effectiveness	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	

	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRIS012 Install and maintain poles, structures and hardware	
	∟UETDRRT001 Install overhead rail traction configurations	
	∟UETDRRT002 Install overhead traction components and equipment	
	∟UETDRRT003 Install rail traction bonds	
	∟UETDRRT004 Install traction overhead wiring systems	
	∟UETDRRT005 Maintain energised d.c. traction overhead wiring system	
	∟UETDRRT008 Maintain overhead rail traction configurations	
	∟UETDRRT009 Maintain overhead traction components and equipment	
	∟UETDRRT011 Maintain traction overhead wiring systems	
	∟UETDRRT012 Operate rail road height access plant near rail traction systems	
	∟UETDRRT014 Test and verify rail traction installations	
	∟UETTDRIS65 Contribute to coordinated HV live working	
UETDRTO010	Maintain energised transmission lines using barehand techniques from a helicopter	60
	∟UETDRTO012 Maintain energised transmission lines using live work stick techniques	
UETDRTO011	Maintain energised transmission lines using live work barehand techniques	70
	∟UETDRTO012 Maintain energised transmission lines	

	using live work stick techniques	
UETDRTO012	Maintain energised transmission lines using live work stick techniques	70
UETDRVC008	Coordinate vegetation control operations	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRIS65	Contribute to coordinated HV live working	50

Qualification Mapping Information

This qualification replaces and is equivalent to UET40419 Certificate IV in ESI - Network Systems

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET40521 Certificate IV in ESI - Power Systems Substations

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work in power system substations in the electricity supply industry (ESI).

This qualification covers selecting, installing, setting up, testing, fault finding, repairing and maintaining electrical systems and equipment in buildings and premises. It also provides a career in installation and maintenance of substations, such as the maintenance of high voltage (HV) power system, including circuit breakers and transformers. It includes substation switching, inspection and diagnosing and rectifying faults. Options are available for skills to be obtained in high current direct current (d.c.) switchgear and equipment, installation of HV plant and equipment and/or the maintenance and commissioning of discrete protection and control systems.

It includes the Electrical Regulatory Authorities Council (ERAC) requirements for an 'Electrician's licence'. Competency development activities in this qualification are subject to regulations directly related to licensing.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1280 weighting points** comprising:

1030 core weighting points listed below; **plus**

250 general elective weighting points from the general elective units listed below.

Choose a total of 250 **weighting points** elective units from the list below, of which between 0 and 50 **weighting points** can be taken from Group A; between 0 and 120 **weighting points** can be taken from Group B; and between 130 and 250 **weighting points** taken from Group C. You may select all your electives from this group.

Up to 50 weighting points of the general elective units Group A may be selected, with

appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with.

Core units		**Weighting Points**
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEG006A	Solve problems in single and three phase low voltage machines ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology	80

	equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits	60
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE105A Fix and secure electrotechnology equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG063A	Arrange circuits, control and protection for general electrical installations	40
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE105A Fix and secure electrotechnology equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic	

	devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	80
UEENEEG103A	Install low voltage wiring and accessories ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c.	20

	circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations	20
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	

	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	

	∟UEENEEG109A Develop and connect electrical control circuits Conditions: Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian state or territory meet the requirements of this unit and its prerequisite requirements. A 'licensed electrician' applying for an 'electrical contractors licence' may be required to undertake this unit to demonstrate their currency with verification of compliance requirements. In this case they are deemed to have met the prerequisites for this unit provided that: they hold a current 'electricians licence' or its equivalent issued in an Australian state or territory and have recently been in permanent employment as a licensed electrician sufficient to evidence current knowledge of applicable standards and regulations.	
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three	60

	phase electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of utilities components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	40
UEENEEG109A	Develop and connect electrical control circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits	80

	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEK142A	Apply environmentally and sustainable procedures in the energy sector	20
UETDREL005	Work safely in the vicinity of live electrical apparatus	20
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
UETDRIS005	Implement & monitor power system environmental & sustainable energy management policies & procedures	30
	Electrotechnology Pathway Unit Group	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	ESI - TDR Pathway Unit Group	
	∟UETDREL001 Apply environmental requirements	
UETDRIS006	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	30
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETTDRSB22	Carry out power systems substation inspection	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle	

utilities industry components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE105A Fix and secure electrotechnology equipment

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

∟UEENEEG199A Conduct compliance and functional

	verification of electrical apparatus and existing circuits	
UETTDRSB23	Install and maintain substation direct current systems	30
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	

Group A: Imported and common elective units		Weighting Points
BSBINS402	Coordinate workplace information systems	40
BSBLDR413	Lead effective workplace relationships	50
BSBLDR414	Lead team effectiveness	50
BSBOPS402	Coordinate business operational plans	40
BSBSTR402	Implement continuous improvement	40

Group B: Qualification elective units		Weighting Points
UETDRIS019	Sample, test, filter and reinstate insulating oil ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ∟UETDREL005 Work safely in the vicinity of live electrical apparatus	40
UETDRSB001	Perform substation switching operations to a given	50

	schedule	
UETTDRIS67	Solve problems in energy supply network equipment Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG006A Solve problems in single and three	40

	phase low voltage machines ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟UETTDRIS67 Solve problems in energy supply network equipment	
UETTDRSB29	Maintain capacitor bank equipment for voltage regulation Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	40
UETTDRSB33	Install high voltage plant and equipment Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology	50

	equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	

Group C: Qualification elective units		**Weighting Points**
UETTDRSB21	Diagnose and rectify faults in substation environment	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	

	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB24	Maintain high voltage power system circuit breakers	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and	

Safety regulations, codes and practices in the workplace

∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE105A Fix and secure electrotechnology equipment

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB25	Maintain high voltage power and instrument transformers	80
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	

	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB26	Install high current d.c. equipment and switchgear	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for	

	low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
UETTDRSB27	Maintain high current d.c. equipment and switchgear	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	

	Pathway 1 - Electrician ∟UEENEEG103A Install low voltage wiring and accessories ∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations ∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations ∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations Pathway 2 - Electrical Fitter ∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB30	Maintain high voltage power system static VAR compensators (SVC) Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG106A Terminate cables, cords and	30

	accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETTDRSB25 Maintain high voltage power and instrument transformers	
	∟UETTDRSB29 Maintain capacitor bank equipment for voltage regulation	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB31	Maintain high voltage power system synchronous condensers	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	

	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB32	Maintain power transformer on load tap changers (OLTC)	80
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	

∟UEENEEE105A Fix and secure electrotechnology equipment

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

∟UETTDRSB25 Maintain high voltage power and instrument transformers

Pathway 1 - Electrician

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

∟UEENEEG199A Conduct compliance and functional

	verification of electrical apparatus and existing circuits	
UETTDRSB34	Carry out surveys using thermovision techniques	30
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical	

	installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB35	Maintain discrete control and protection systems	80
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and	

	sustainable procedures in the energy sector	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB36	Commission discrete control and protection systems	30
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and	

	accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETTDRSB25 Maintain high voltage power and instrument transformers	
	∟UETTDRSB29 Maintain capacitor bank equipment for voltage regulation	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB37	Maintain power system distribution field devices	80
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three	

	phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB38	Commission power system distribution field devices	30
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology	

equipment

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

∟UETTDRSB37 Maintain power system distribution field devices

Pathway 1 - Electrician

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Qualification Mapping Information

This qualification replaces and is equivalent to UET40519 Certificate IV in ESI - Power Systems Substations

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET40621 Certificate IV in ESI - Power Systems Network Infrastructure

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work on power system network infrastructure in the electricity supply industry (ESI).

This qualification covers the selection, installation, set up, testing, fault finding, repair and maintenance of electrical systems and equipment in buildings and premises. It includes skills and knowledge needed for a career in installation and maintenance of network infrastructure in the transmission, distribution or rail traction in the ESI.

It includes Electrical Regulatory Authorities Council (ERAC) requirements for an Electrician's licence. Competency development activities in this qualification are subject to regulations directly related to licensing.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1280 weighting points** comprising:

940 core weighting points listed below; **plus**

340 general elective weighting points from the general elective units listed below.

Choose a total of 340 **weighting points** elective units from the list below, of which between 0 and 50 **weighting points** can be taken from Group A; between 0 and 140 **weighting points** can be taken from Group B; and between 200 and 340 **weighting points** taken from Group C. You may select all your electives from this group.

Up to 50 weighting points of the general elective units Group A may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or

accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with.

Core units		**Weighting Points**
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEG006A	Solve problems in single and three phase low voltage machines ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment	80

	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG063A	Arrange circuits, control and protection for general electrical installations	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnolgy equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c.	

	circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG101A	Solve problems in electromagnetic devices and related circuits	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
UEENEEG103A	Install low voltage wiring and accessories	20
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG106A Terminate cables, cords and	

	accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations	20
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	

	∟UEENEEG109A Develop and connect electrical control circuits	
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	

	Conditions: Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian state or territory meet the requirements of this unit and its prerequisite requirements. A 'licensed electrician' applying for an 'electrical contractor's licence' may be required to undertake this unit to demonstrate their currency with verification of compliance requirements. In this case they are deemed to have met the prerequisites for this unit provided that they hold a current 'electricians licence' or its equivalent issued in an Australian state or territory and have recently been in permanent employment as a licensed electrician sufficient to evidence current knowledge of applicable standards and regulations.	
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and	60

	protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of utilities components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	40
UEENEEG109A	Develop and connect electrical control circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment	80

	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEK142A	Apply environmentally and sustainable procedures in the energy sector	20
UETDREL005	Work safely in the vicinity of live electrical apparatus	20
	∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
UETDRIS005	Implement & monitor power system environmental & sustainable energy management policies & procedures	30
	Electrotechnology Pathway Unit Group	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	ESI - TDR Pathway Unit Group	
	∟UETDREL001 Apply environmental requirements	
UETDRIS006	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	30
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	

Group A: Imported and common elective units		**Weighting Points**
BSBINS402	Coordinate workplace information systems	40
BSBLDR413	Lead effective workplace relationships	50
BSBLDR414	Lead team effectiveness	50

BSBOPS402	Coordinate business operational plans	40
BSBSTR402	Implement continuous improvement	40
Group B: Qualification elective units		**Weighting Points**
UEENEEG171A	Install, set up and commission interval metering	20
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEG104A Install appliances, switchgear and	

	associated accessories for low voltage electrical installations	
UETDRIS017	Perform high voltage field switching operation to a given schedule ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟UEECD0019 Fabricate, assemble and dismantle utilities industry components ∟UEECD0044 Solve problems in multiple path circuits ∟UEECD0046 Solve problems in single path circuits ∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications ∟UEEEL0020 Solve problems in low voltage a.c. circuits ∟UEEEL0021 Solve problems in magnetic and electromagnetic devices ∟UETDREL001 Apply environmental requirements ∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus ∟UETDREL005 Work safely in the vicinity of live electrical apparatus ∟UETDRIS018 Perform low voltage field switching operations to a given schedule	50
UETDRIS018	Perform low voltage field switching operation to a given schedule ∟UEECD0007 Apply work health and safety regulations, codes and practices in the workplace ∟UEECD0044 Solve problems in multiple path circuits ∟UEECD0046 Solve problems in single path circuits ∟UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications ∟UEEEL0020 Solve problems in low voltage a.c. circuits ∟UEEEL0021 Solve problems in magnetic and electromagnetic devices ∟UETDREL001 Apply environmental requirements ∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	50

	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRIS019	Sample, test, filter and reinstate insulating oil	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
UETDRSB001	Perform substation switching operations to a given schedule	50
UETTDRIS67	Solve problems in energy supply network equipment	80
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	

	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UETTDRIS68	Solve problems in energy supply network protection equipment and systems	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UETTDRIS67 Solve problems in energy supply network equipment	

Group C: Qualification elective units		**Weighting Points**
UEENEEG076A	Install and replace low voltage current transformer metering	20
	Note: Those holding an ‘Unrestricted Electrician’s Licence’ or equivalent issued in an Australian state or territory meet the prerequisite requirements of this unit.	

	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
UETDRDO002	Inspect, maintain and restore energised low voltage overhead distribution network infrastructure	50

∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE105A Fix and secure electrotechnology equipment

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

∟UETDREL005 Work safely in the vicinity of live

	electrical apparatus ∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETDRIS009 Install and maintain ESI network infrastructure electrical equipment ∟UETTDRIS67 Solve problems in energy supply network equipment	
UETDRDU004	Install and maintain network infrastructure HV underground cables ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG103A Install low voltage wiring and accessories ∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical	50

	installations ∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations ∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits ∟UEENEEG109A Develop and connect electrical control circuits ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ∟UETDRDU005 Install and maintain network infrastructure LV underground cables ∟UETDREL005 Work safely in the vicinity of live electrical apparatus ∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETDRIS009 Install and maintain ESI network infrastructure electrical equipment	
UETDRDU005	Install and maintain network infrastructure LV underground cables ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	40

	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRIS009 Install and maintain ESI network infrastructure electrical equipment	
UETDRIS001	Coordinate and direct power system switching schedules	40
	Common Unit Group	

∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE105A Fix and secure electrotechnology equipment

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

Transmission Overhead Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS017 Perform high voltage field switching operation to a given schedule

∟UETDRTO006 Install and maintain transmission conductors

∟UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

∟UETDRDO005 Maintain overhead energised low voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures

and hardware

∟UETDRIS018 Perform low voltage field switching operation to a given schedule

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

∟UETDRRT013 Perform rail traction switching operations to a given schedule

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

∟UETDRIS018 Perform low voltage field switching operation to a given schedule

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to

	control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETDRSB001 Perform substation switching operations to a given schedule	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETDRIS002	Coordinate power system permit procedures	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	Transmission Overhead Pathway Group	

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS017 Perform high voltage field switching operation to a given schedule

∟UETDRTO006 Install and maintain transmission conductors

∟UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

∟UETDRDO005 Maintain overhead energised low voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRIS018 Perform low voltage field switching operation to a given schedule

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring

systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

∟UETDRRT013 Perform rail traction switching operations to a given schedule

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

∟UETDRIS018 Perform low voltage field switching operation to a given schedule

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

	∟UETDRSB001 Perform substation switching operations to a given schedule	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETDRIS003	Develop high voltage switching schedule	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS017 Perform high voltage field switching operation to a given schedule	
	Transmission Overhead Pathway Group	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution overhead conductors and cables	
	∟UETDRTO006 Install and maintain transmission conductors	
	∟UETDRTO007 Install and maintain transmission structures and hardware	
	Distribution Overhead Pathway Group	
	∟UETDRDO005 Maintain overhead energised low voltage distribution network	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDRIS007 Install and maintain distribution	

overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

∟UETDRDU016 Lay power cables

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS011 Install and maintain low voltage underground services

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology

	work ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits ∟UEENEEG109A Develop and connect electrical control circuits ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ∟UETTDRIS67 Solve problems in energy supply network equipment	
UETDRIS004	Develop low voltage switching schedule Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UETDREL005 Work safely in the vicinity of live electrical apparatus ∟UETDRIS018 Perform low voltage field switching operation to a given schedule Transmission Overhead Pathway Group ∟UETDREL001 Apply environmental requirements ∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	40

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRTO006 Install and maintain transmission conductors

∟UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

∟UETDRDO005 Maintain overhead energised low voltage distribution network

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS008 Install and maintain electrical apparatus

∟UETDRIS010 Install and maintain low voltage overhead services

∟UETDRIS012 Install and maintain poles, structures and hardware

Rail Traction Pathway Group

∟UETDREL001 Apply environmental requirements

∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

∟UETDRIS007 Install and maintain distribution overhead conductors and cables

∟UETDRIS012 Install and maintain poles, structures and hardware

∟UETDRRT002 Install overhead traction components and equipment

∟UETDRRT003 Install rail traction bonds

∟UETDRRT004 Install traction overhead wiring systems

∟UETDRRT009 Maintain overhead traction components and equipment

∟UETDRRT011 Maintain traction overhead wiring systems

Distribution Cable Jointing Pathway Group

∟UETDRDU013 Joint, terminate and maintain high

	voltage underground polymeric cable	
	∟UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable	
	∟UETDRDU016 Lay power cables	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus	
	∟UETDRIS008 Install and maintain electrical apparatus	
	∟UETDRIS011 Install and maintain low voltage underground services	
	Electrical Pathway Group	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETDRIS009	Install and maintain ESI network infrastructure electrical equipment	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology	

equipment

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures

	and programs	
UETDRSB001	Perform substation switching operations to a given schedule	50
UETDRTO008	Install/maintain overhead transmission network infrastructure	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	

	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETDRTO009	Install/maintain transmission network infrastructure electrical equipment	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c.	

	circuits	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRTO008 Install/maintain overhead transmission network infrastructure	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETDRTS013	Install and replace high voltage metering and associated equipment	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

∟UEENEEG063A Arrange circuits, control and protection for general electrical installations

∟UEENEEG076A Install and replace low voltage current transformer metering

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

∟UEENEEG109A Develop and connect electrical control circuits

∟UEENEEG171A Install, set up and commission interval metering

∟UETDREL001 Apply environmental requirements

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRTS022 Perform current injection testing using phantom load

UETDRTS022	Perform current injection testing using phantom load	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEG171A Install, set up and commission interval metering	
	∟UETDREL001 Apply environmental requirements	

Qualification Mapping Information

This qualification replaces and is equivalent to UET40619 Certificate IV in ESI - Power Systems Network Infrastructure

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET50221 Diploma of ESI - Power Systems

Modification History

Release 2. Updated superseded elective units.

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a High Voltage (HV) Substation Project Manager or a Senior Systems Operator (ESI) or a Power Systems Technical Officer.

This qualification covers overseeing the construction of electrical substations and related projects within the ESI. It also includes managing personnel, the business aspects of projects and giving specialist advice to deal with day-to-day issues and problems.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1600 weighting points** comprising:

700 core weighting points listed below; **plus**

900 general elective weighting points from the general elective units listed below.

Choose a total of 900 **weighting points** elective units from the list below, of which between 0 and 270 **weighting points** can be taken from Group A; between 0 and 400 **weighting points** can be taken from Group B; between 0 and 200 **weighting points** can be taken from Group C and between 140 and 900 **weighting points** taken from Group D. You may select all your electives from this group.

Up to 270 weighting points of the general elective units Group A may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed

weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with.

Core units		Weighting Points
UEENEED104A	Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	40
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems ∟ UEENEEE029B Solve electrotechnical problems or ∟ UEENEEG102A Solve problems in low voltage a.c. circuits or ∟ UEENEEH014B Troubleshoot frequency dependent circuits	60

UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	80
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits and ∟ UEENEEG102A Solve problems in low voltage a.c. circuits	60
UETDREL001	Apply environmental requirements	20
UETDREL005	Work safely in the vicinity of live electrical apparatus ∟ UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	20
UETDRIS005	Implement & monitor power system environmental & sustainable energy management policies & procedures Electrotechnology Pathway Unit Group ∟ UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ESI - TDR Pathway Unit Group ∟ UETDREL001 Apply environmental requirements	30
UETDRIS006	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	30

Group A: Imported and common elective units		Weighting Points
BSBFIN501	Manage budgets and financial plans	70
BSBHRM523	Coordinate the learning and development of teams and individuals	60
BSBINS501	Implement information and knowledge management systems	50
BSBLDR522	Manage people performance	70
BSBOPS502	Manage business operational plans	60
BSBOPS505	Manage organisational customer service	40
BSBPEF501	Manage personal and professional development	60
BSBSTR501	Establish innovative work environments	50
BSBSTR502	Facilitate continuous improvement	60
BSBSUS511	Develop workplace policies and procedures for sustainability	50
BSBTWK502	Manage team effectiveness	60

Group B: Qualification elective units		Weighting Points
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE105A Fix and secure electrotechnology equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	

UEENEEH102A	Repairs basic electronic apparatus faults by replacement of components ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	40
UEENEEH112A	Troubleshoot digital sub-systems ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEH102A Repair basic electronic apparatus faults by replacement of components	80
UEENEEH139A	Troubleshoot basic amplifier circuits ∟ UEENEEH102A Repair basic electronic apparatus faults by replacement of components AND ∟ UEENEEH114A Troubleshoot resonance circuits in an electronic apparatus OR ∟ UEENEEG102A Solve problems in low voltage a.c. circuits	40
UETTDREL15	Respond to power systems technical enquiries and requests	40
UETTDRIS67	Solve problems in energy supply network equipment Common Unit Group ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE105A Fix and secure electrotechnology equipment ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c.	80

	circuits ∟ UEENEEG006A Solve problems in single and three phase low voltage machines ∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UETTDRIS68	Solve problems in energy supply network protection equipment and systems Common Unit Group ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE105A Fix and secure electrotechnology equipment ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG006A Solve problems in single and three phase low voltage machines ∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟ UETTDRIS67 Solve problems in energy supply network equipment	40

Group C: Qualification elective units		**Weighting Points**
UEENEEE190A	Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEED104A Use software for engineering applications ∟ UEENEEE102A Fabricate, dismantle, assemble of utilities industry components ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	60

UEENEEE191A	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software ∟ UEENEED104A Use software for engineering applications ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, dismantle, assemble of utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE190A Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications	60
UEENEEE192A	Produce detailed electrotechnology /utilities drawings using computer aided design equipment and software ∟ UEENEED104A Use software for engineering applications ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, dismantle, assemble of utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE190A Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications ∟ UEENEEE191A Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software	60
UEENEEI155A	Develop structured programs to control external devices ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UETDRDS008	Draft and layout a power system distribution substation minor upgrade ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	60

	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS009	Draft and layout a power system overhead distribution extension	60
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures	

	and programs	
UETDRDS010	Draft and layout a power system street lighting system ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	60
UETDRDS011	Draft and layout a power system underground distribution extension ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	60

	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
Group D: Qualification elective units		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEECO0014	Prepare tender submissions for electrotechnology projects	60
	∟ UEECO0001 Estimate electrotechnology projects	
UEENEER001B	Contribute to the planning of a research project	120
UEENEER002B	Contribute to the conduct of a research project	120
UEENEER003B	Contribute to the development of a product/application/ service	120
UEENEER004B	Contribute to the trial of a product/application/ service	120
UEPOPS015	Conduct project management	60
UEPOPS038	Evaluate cost estimations and initiate appropriate solutions	40
	∟ UEECO0001 Estimate electrotechnology projects	
UETDRDS002	Design overhead distribution power systems	140
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic	

	devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Pathway Unit Group 1	
	∟ UETDRDS013 Organise and implement ESI line and easement surveys	
	∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure	
	Pathway Unit Group 2	
	∟ UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS003	Design power system distribution substations	140
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c.	

	circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Pathway Unit Group 1	
	∟ UETDRDS013 Organise and implement ESI line and easement surveys	
	∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure	
	Pathway Unit Group 2	
	∟ UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS004	Design power system public lighting systems	140
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to	

	problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs Pathway Unit Group 1 ∟ UETDRDS013 Organise and implement ESI line and easement surveys ∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure Pathway Unit Group 2 ∟ UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS005	Design underground distribution power systems Common Unit Group ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	140

	∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs Pathway Unit Group 1 ∟ UETDRDS013 Organise and implement ESI line and easement surveys ∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure Pathway Unit Group 2 ∟ UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS006	Develop high voltage and low voltage distribution protection systems ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live	150

	electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS007	Develop planned power systems outage strategies	140
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS012	Investigate quality of power systems supply issues	140
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDRDS002 Design overhead distribution power systems	
	∟ UETDRDS005 Design underground distribution	

	power systems ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs Pathway Unit Group 1 ∟ UETDRDS013 Organise and implement ESI line and easement surveys ∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure Pathway Unit Group 2 ∟ UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS013	Organise and implement ESI line and easement surveys	140
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power	

	system organisational WHS/OHS policies, procedures and programs	
UETDRDS014	Prepare and manage detailed construction plans for electrical power system infrastructure	140
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRSO001	Coordinate high voltage distribution and sub-transmission networks	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	

	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟ UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
UETDRSO002	Coordinate high voltage transmission network	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	

	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟ UETDRSO004 Develop and evaluate power systems transmission switching programs	
UETDRSO003	Coordinate power system operations in a regulated energy market	150
	Common Unit Group	
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system	

	environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Distribution and Sub-transmission Pathway Unit Group	
	∟ UETDRSO001 Coordinate high voltage distribution and sub-transmission networks	
	∟ UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
	Transmission Pathway Unit Group	
	∟ UETDRSO002 Coordinate high voltage transmission network	
	∟ UETDRSO004 Develop and evaluate power systems transmission switching programs	
UETDRSO004	Develop and evaluate power systems transmission switching programs	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	

	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRSO005	Develop high voltage distribution and sub-transmission switching programs	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures	

	and programs	
UETDRSO006	Develop low voltage distribution switching programs	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRSO011	Respond to discrete and interdependent protection operations	150
	Common Unit Group	
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and	

	Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Distribution and Sub-transmission Pathway Unit Group	
	∟ UETDRSO001 Coordinate high voltage distribution and sub-transmission networks	
	∟ UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
	Transmission Pathway Unit Group	
	∟ UETDRSO002 Coordinate high voltage transmission network	
	∟ UETDRSO004 Develop and evaluate power systems transmission switching programs	
UETDRTS004	Commission interdependent network protection and control systems	150

	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟ UETDRTS010 Develop power systems secondary isolation instructional documents	
	∟ UETDRTS017 Maintain interdependent network protection and control systems	
UETDRTS005	Commission power systems metering schemes	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟ UETDRTS010 Develop power systems secondary isolation instructional documents	
	∟ UETDRTS014 Maintain and test and metering schemes	
UETDRTS010	Develop power systems secondary isolation instructional documents	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	

	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE124A Compile and produce an energy sector detailed report ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS011	Install and maintain power system communication equipment ∟ UEENEED104A Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE124A Compile and produce an energy sector detailed report ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic	150

	engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS014	Maintain and test and metering schemes	140
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	

	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟ UETDRTS010 Develop power systems secondary isolation instructional documents	
UETDRTS015	Maintain complex network protection and control systems	180
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	

	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟ UETDRTS010 Develop power systems secondary isolation instructional documents ∟ UETDRTS017 Maintain interdependent network protection and control systems	
UETDRTS017	Maintain interdependent network protection and control systems ∟ UEENEED104A Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE124A Compile and produce an energy sector detailed report ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	150

	∟ UETDRTS010 Develop power systems secondary isolation instructional documents	
UETDRTS018	Maintain, test and commission power systems voltage regulating equipment	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS021	Perform accuracy checks on power systems instrument transformers	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and	

	Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS023	Repair, test and calibrate protection relays and meters	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	

	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus	60
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE105A Fix and secure electrotechnology equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟ UETTDRIS67 Solve problems in energy supply	

	network equipment ∟ UETTDRIS68 Solve problems in energy supply network protection equipment and systems	
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems Common Unit Group ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE105A Fix and secure electrotechnology equipment ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG006A Solve problems in single and three phase low voltage machines ∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟ UETTDRIS67 Solve problems in energy supply network equipment ∟ UETTDRIS68 Solve problems in energy supply network protection equipment and systems ∟ UETTDRIS69 Diagnose and rectify faults in energy supply apparatus	60
UETTDRSO45	Operate and monitor system SCADA equipment Common Unit Group ∟ UETTDREL15 Respond to power systems technical enquiries and requests	150
UETTDRSO46	Monitor and control the field staff activities To minimise incidents related to safe systems of work, entry into this unit requires at a minimum that an individual has demonstrated or possesses relevant technical engineering discipline competencies of at least	150

AQF level 3. It is intended that an individual will be expected to perform with a large degree of autonomy in decision-making, whilst in an individual environment.

This may include immediate response to protect human life, adverse effect on safety, security of supply or the integrity of the assets.

NOTE: Typically the following disciplines provide direct entry; electrical or instrumentation, fitting and turning or mechanical trade.

Where an individual does not possess or demonstrate the requisite entry requirement, an equivalent bridging program shall be used to ensure equivalence of entry.

Qualification Mapping Information

This qualification replaces and is equivalent to UET50219 Diploma of ESI - Power Systems

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET50321 Diploma of ESI - Power Systems Operations

Modification History

Release 2. Updated superseded TLI elective unit.

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a Power Systems Technical Officer, a High Voltage (HV) Substation Project Manager or a Senior Systems Operator.

This qualification covers designing new overhead and underground powerline systems, overseeing the construction of electrical substations and related projects. These roles may also manage personnel, the business aspects of projects and give specialist advice to deal with day-to-day issues and problems.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1600 weighting points** comprising:

850 core weighting points listed below; **plus**

750 general elective weighting points from the general elective units listed below.

Choose a total of 750 **weighting points** elective units from the list below, of which between 0 and 270 **weighting points** can be taken from Group A; between 0 and 360 **weighting points** can be taken from Group B; between 0 and 200 **weighting points** can be taken from Group C and between 190 and 750 **weighting points** taken from Group D. You may select all your electives from this group.

Up to 270 weighting points of the general elective units Group A may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the

qualification. Previously assigned weighting points are listed in UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with.

Core units		**Weighting Points**
UEENEED104A	Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	40
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE104A	Solve problems in d.c. circuits ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems ∟ UEENEEE029B Solve electrotechnical problems or ∟ UEENEEG102A Solve problems in low voltage a.c. circuits or ∟ UEENEEH014B Troubleshoot frequency dependent circuits	60
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟ UEENEEE101A Apply Occupational Health and	60

	Safety regulations, codes and practices in the workplace ∟ UEENEEE104A Solve problems in d.c. circuits	
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	80
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits and ∟ UEENEEG102A Solve problems in low voltage a.c. circuits	60
UETDREL001	Apply environmental requirements	20
UETDREL005	Work safely in the vicinity of live electrical apparatus	20
UETDRIS005	Implement & monitor power system environmental & sustainable energy management policies & procedures Electrotechnology Pathway Unit Group ∟ UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ESI - TDR Pathway Unit Group ∟ UETDREL001 Apply environmental requirements	30
UETDRIS006	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	30
UETTDREL15	Respond to power systems technical enquiries and requests	40
UETTDRSO45	Operate and monitor system SCADA equipment Common Unit Group ∟ UETTDREL15 Respond to power systems technical	150

	enquiries and requests	
Group A: Imported and common elective units		**Weighting Points**
BSBFIN501	Manage budgets and financial plans	70
BSBHRM523	Coordinate the learning and development of teams and individuals	60
BSBINS501	Implement information and knowledge management systems	50
BSBLDR522	Manage people performance	70
BSBOPS502	Manage business operational plans	60
BSBOPS505	Manage organisational customer service	40
BSBPEF501	Manage personal and professional development	60
BSBSTR501	Establish innovative work environments	50
BSBSTR502	Facilitate continuous improvement	60
BSBTWK502	Manage team effectiveness	60
BSBSUS511	Develop workplace policies and procedures for sustainability	50
TLIF0021	Administer the implementation of fatigue management strategies	50
TLIF2010	Apply fatigue management strategies	30
Group B: Qualification elective units		Weighting Points
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟ UEENEEE104A Solve problems in d.c. circuits	

	∟ UEENEEE105A Fix and secure electrotechnology equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEH102A	Repairs basic electronic apparatus faults by replacement of components	40
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	
UEENEEH112A	Troubleshoot digital sub-systems	80
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEH102A Repair basic electronic apparatus faults by replacement of components	
UEENEEH139A	Troubleshoot basic amplifier circuits	40
	∟ UEENEEH102A Repair basic electronic apparatus faults by replacement of components	
	AND	
	∟ UEENEEH114A Troubleshoot resonance circuits in an electronic apparatus	
	OR	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
UETTDRIS67	Solve problems in energy supply network equipment	80
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	

	∟ UEENEEE105A Fix and secure electrotechnology equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UETTDRIS68	Solve problems in energy supply network protection equipment and systems	40
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE105A Fix and secure electrotechnology equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟ UETTDRIS67 Solve problems in energy supply network equipment	

Group C: Qualification elective units		Weighting Points
UEENEEI155A	Develop structured programs to control external devices	40
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

UETDRDS008	Draft and layout a power system distribution substation minor upgrade	60
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS009	Draft and layout a power system overhead distribution extension	60
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system	

	environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS010	Draft and layout a power system street lighting system	60
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS011	Draft and layout a power system underground distribution extension	60
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	

	∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
Group D: Qualification elective units		Weighting Points
UETDRDS002	Design overhead distribution power systems	140
	Common Unit Group ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	

	Pathway Unit Group 1	
	∟ UETDRDS013 Organise and implement ESI line and easement surveys	
	∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure	
	Pathway Unit Group 2	
	∟ UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS003	Design power system distribution substations	140
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Pathway Unit Group 1	
	∟ UETDRDS013 Organise and implement ESI line and	

	easement surveys	
	∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure	
	Pathway Unit Group 2	
	∟ UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS004	Design power system public lighting systems	140
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Pathway Unit Group 1	
	∟ UETDRDS013 Organise and implement ESI line and easement surveys	
	∟ UETDRDS014 Prepare and manage detailed	

	construction plans for electrical power system infrastructure	
	Pathway Unit Group 2	
	∟ UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS005	Design underground distribution power systems	140
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Pathway Unit Group 1	
	∟ UETDRDS013 Organise and implement ESI line and easement surveys	
	∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure	

	Pathway Unit Group 2 ∟ UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS006	Develop high voltage and low voltage distribution protection systems ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	150
UETDRDS007	Develop planned power systems outage strategies ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEED104A Use engineering applications software on personal computers ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS006 Implement and monitor the power	140

	system organisational WHS/OHS policies, procedures and programs	
UETDRDS012	Investigate quality of power systems supply issues	140
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDRDS002 Design overhead distribution power systems	
	∟ UETDRDS005 Design underground distribution power systems	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Pathway Unit Group 1	
	∟ UETDRDS013 Organise and implement ESI line and easement surveys	
	∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system	

	infrastructure Pathway Unit Group 2 ∟ UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS013	Organise and implement ESI line and easement surveys ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	140
UETDRDS014	Prepare and manage detailed construction plans for electrical power system infrastructure ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UETDREL001 Apply environmental requirements	140

	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRSO001	Coordinate high voltage distribution and sub-transmission networks	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures	

	and programs ∟ UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
UETDRSO002	Coordinate high voltage transmission network ∟ UEENEED104A Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE124A Compile and produce an energy sector detailed report ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟ UETDRSO004 Develop and evaluate power systems transmission switching programs	150
UETDRSO003	Coordinate power system operations in a regulated energy market	150

Common Unit Group

∟UEENEED104A Use engineering applications software on personal computers

∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE124A Compile and produce an energy sector detailed report

∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

∟UEENEEE126A Provide solutions to basic engineering computational problems

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETDREL001 Apply environmental requirements

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Distribution and Sub-transmission Pathway Unit Group

∟UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

∟UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Transmission Pathway Unit Group

∟UETDRSO002 Coordinate high voltage transmission network

	∟ UETDRSO004 Develop and evaluate power systems transmission switching programs	
UETDRSO004	Develop and evaluate power systems transmission switching programs	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRSO005	Develop high voltage distribution and sub-transmission switching programs	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and	

	Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRSO006	Develop low voltage distribution switching programs	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	

	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRSO011	Respond to discrete and interdependent protection operations Common Unit Group ∟ UEENEED104A Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE124A Compile and produce an energy sector detailed report ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	150

	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Distribution and Sub-transmission Pathway Unit Group	
	∟ UETDRSO001 Coordinate high voltage distribution and sub-transmission networks	
	∟ UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
	Transmission Pathway Unit Group	
	∟ UETDRSO002 Coordinate high voltage transmission network	
	∟ UETDRSO004 Develop and evaluate power systems transmission switching programs	
UETDRTS004	Commission interdependent network protection and control systems	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic	

	engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟ UETDRTS010 Develop power systems secondary isolation instructional documents	
	∟ UETDRTS017 Maintain interdependent network protection and control systems	
UETDRTS005	Commission power systems metering schemes	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c.	

	circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟ UETDRTS010 Develop power systems secondary isolation instructional documents	
	∟ UETDRTS014 Maintain and test and metering schemes	
UETDRTS010	Develop power systems secondary isolation instructional documents	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	

	∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS011	Install and maintain power system communication equipment ∟ UEENEED104A Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE124A Compile and produce an energy sector detailed report ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power	150

	system organisational WHS/OHS policies, procedures and programs	
UETDRTS014	Maintain and test and metering schemes	140
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟ UETDRTS010 Develop power systems secondary isolation instructional documents	
UETDRTS015	Maintain complex network protection and control systems	180
	∟ UEENEED104A Use engineering applications software on personal computers	

	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟ UETDRTS017 Maintain interdependent network protection and control systems	
	∟ UETDRTS010 Develop power systems secondary isolation instructional documents	
UETDRTS017	Maintain interdependent network protection and control systems	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle	

	utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE124A Compile and produce an energy sector detailed report ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟ UETDRTS010 Develop power systems secondary isolation instructional documents	
UETDRTS018	Maintain, test and commission power systems voltage regulating equipment ∟ UEENEED104A Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE124A Compile and produce an energy	150

	sector detailed report ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS021	Perform accuracy checks on power systems instrument transformers ∟ UEENEED104A Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE124A Compile and produce an energy sector detailed report ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	150

	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS023	Repair, test and calibrate protection relays and meters	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system	

	environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus	60
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE105A Fix and secure electrotechnology equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟ UETTDRIS67 Solve problems in energy supply network equipment	
	∟ UETTDRIS68 Solve problems in energy supply network protection equipment and systems	
UETTDRIS70	Diagnose and rectify faults in electrical energy distribution systems	60
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE105A Fix and secure electrotechnology equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules,	

	standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG006A Solve problems in single and three phase low voltage machines ∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟ UETTDRIS67 Solve problems in energy supply network equipment ∟ UETTDRIS68 Solve problems in energy supply network protection equipment and systems ∟ UETTDRIS69 Diagnose and rectify faults in energy supply apparatus	
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems Common Unit Group ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE105A Fix and secure electrotechnology equipment ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG006A Solve problems in single and three phase low voltage machines ∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟ UETTDRIS67 Solve problems in energy supply network equipment ∟ UETTDRIS68 Solve problems in energy supply network protection equipment and systems	60

	∟ UETTDRIS69 Diagnose and rectify faults in energy supply apparatus	
UETTDRIS72	Diagnose and rectify faults in distributed generation systems Common Unit Group ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE105A Fix and secure electrotechnology equipment ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG006A Solve problems in single and three phase low voltage machines ∟ UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟ UETTDRIS67 Solve problems in energy supply network equipment ∟ UETTDRIS68 Solve problems in energy supply network protection equipment and systems ∟ UETTDRIS69 Diagnose and rectify faults in energy supply apparatus	60
UETTDRSO46	Monitor and control the field staff activities To minimise incidents related to safe systems of work, entry into this unit requires at a minimum that an individual has demonstrated or possesses relevant technical engineering discipline competencies of at least AQF level 3. It is intended that an individual will be expected to perform with a large degree of autonomy in decision-making, whilst in an individual environment. This may include immediate response to protect human life, adverse effect on safety, security of supply or the integrity of the assets.	150

NOTE: Typically the following disciplines provide direct entry; electrical or instrumentation, fitting and turning or mechanical trade.

Where an individual does not possess or demonstrate the requisite entry requirement, an equivalent bridging program shall be used to ensure equivalence of entry.

Qualification Mapping Information

This qualification replaces and is equivalent to UET50319 Diploma of ESI - Power Systems Operations

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET60221 Advanced Diploma of ESI - Power Systems

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a Power System Senior Technical Officer or a Power Distribution System Engineer.

This qualification covers high-level managerial, design, testing and system operation functions in the transmission and distribution sectors of the ESI. These roles may also install, commission, maintain, diagnose and repair the hardware and software of complex power system protection, control and metering systems.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **2160 weighting points** comprising:

820 core weighting points listed below; **plus**

1340 general elective weighting points from the general elective units listed below.

Choose a total of 1340 **weighting points** elective units from the list below, of which between 0 and 360 **weighting points** can be taken from Group A; between 0 and 400 **weighting points** can be taken from Group B; between 0 and 200 **weighting points** can be taken from Group C, between 140 and 900 **weighting points** can be taken from Group D and between 440 and 1200 **weighting points** taken from Group E.

Up to 360 weighting points of the general elective units Group A may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure all prerequisite units specified are complied with.

Core units		Weighting Points
UEENEED104A	Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	40
UEENEEE083A	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems ∟ UEENEEE029B Solve electrotechnical problems or ∟ UEENEEG102A Solve problems in low voltage a.c. circuits or	60

	∟UEENEEH014B Troubleshoot frequency dependent circuits	
UEENEEG101A	Solve problems in electromagnetic devices and related circuits	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits	60
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	and	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
UETDREL001	Apply environmental requirements	20
UETDREL005	Work safely in the vicinity of live electrical apparatus	20
UETDRIS005	Implement & monitor power system environmental & sustainable energy management policies & procedures	30
	Electrotechnology Pathway Unit Group	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	ESI - TDR Pathway Unit Group	
	∟UETDREL001 Apply environmental requirements	
UETDRIS006	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	30
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	

Group A: Imported and common elective units		Weighting Points
BSBFIN501	Manage budgets and financial plans	70
BSBHRM523	Coordinate the learning and development of teams and individuals	60
BSBINS501	Implement information and knowledge management systems	50
BSBLDR522	Manage people performance	70
BSBOPS502	Manage business operational plans	60
BSBOPS505	Manage organisational customer service	40
BSBPEF501	Manage personal and professional development	60
BSBSTR501	Establish innovative work environments	50
BSBSTR502	Facilitate continuous improvement	60
BSBSUS511	Develop workplace policies and procedures for sustainability	50
BSBTWK502	Manage team effectiveness	60

Group B: Qualification elective units		Weighting Points
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE105A Fix and secure electrotechnology equipment	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c.	

	circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEH102A	Repairs basic electronic apparatus faults by replacement of components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	40
UEENEEH112A	Troubleshoot digital sub-systems ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEH102A Repair basic electronic apparatus faults by replacement of components	80
UEENEEH139A	Troubleshoot basic amplifier circuits ∟UEENEEH102A Repair basic electronic apparatus faults by replacement of components AND ∟UEENEEH114A Troubleshoot resonance circuits in an electronic apparatus OR ∟UEENEEG102A Solve problems in low voltage a.c. circuits	40
UETTDREL15	Respond to power systems technical enquiries and requests	40
UETTDRIS67	Solve problems in energy supply network equipment Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	80

	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UETTDRIS68	Solve problems in energy supply network protection equipment and systems	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UETTDRIS67 Solve problems in energy supply network equipment	

Group C: Qualification elective units		**Weighting Points**
UEENEED117A	Install and configure network systems for internetworking	120
	∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	
UEENEEI155A	Develop structured programs to control external devices	40
	∟UEENEEE101A Apply Occupational Health and	

	Safety regulations, codes and practices in the workplace	
UETDRDS008	Draft and layout a power system distribution substation minor upgrade	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS009	Draft and layout a power system overhead distribution extension	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	

	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS010	Draft and layout a power system street lighting system	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS011	Draft and layout a power system underground distribution extension	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	

	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
Group D: Qualification elective units		**Weighting Points**
UEENEEI156A	Develop and test code for microcontroller devices	60
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
UETDRDS002	Design overhead distribution power systems	140
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	

	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Pathway Unit Group 1	
	∟UETDRDS013 Organise and implement ESI line and easement surveys	
	∟UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure	
	Pathway Unit Group 2	
	∟UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS003	Design power system distribution substations	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	

	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Pathway Unit Group 1	
	∟UETDRDS013 Organise and implement ESI line and easement surveys	
	∟UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure	
	Pathway Unit Group 2	
	∟UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS004	Design power system public lighting systems	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management	

	policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Pathway Unit Group 1	
	∟UETDRDS013 Organise and implement ESI line and easement surveys	
	∟UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure	
	Pathway Unit Group 2	
	∟UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS005	Design underground distribution power systems	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power	

	system organisational WHS/OHS policies, procedures and programs	
	Pathway Unit Group 1	
	∟UETDRDS013 Organise and implement ESI line and easement surveys	
	∟UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure	
	Pathway Unit Group 2	
	∟UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS006	Develop high voltage and low voltage distribution protection systems	150
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	

UETDRDS007	Develop planned power systems outage strategies	140
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRDS012	Investigate quality of power systems supply issues	140
	Common Unit Group	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDRDS002 Design overhead distribution power systems	
	∟ UETDRDS005 Design underground distribution power systems	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management	

	policies & procedures ∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs Pathway Unit Group 1 ∟UETDRDS013 Organise and implement ESI line and easement surveys ∟UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure Pathway Unit Group 2 ∟UETDRDS006 Develop high voltage and low voltage distribution protection systems	
UETDRDS013	Organise and implement ESI line and easement surveys ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure ∟UETDREL001 Apply environmental requirements ∟UETDREL005 Work safely in the vicinity of live electrical apparatus ∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	140
UETDRDS014	Prepare and manage detailed construction plans for electrical power system infrastructure ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	140

	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRSO001	Coordinate high voltage distribution and sub-transmission networks	150
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	

	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
UETDRSO002	Coordinate high voltage transmission network	150
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	

	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRSO004 Develop and evaluate power systems transmission switching programs	
UETDRSO003	Coordinate power system operations in a regulated energy market	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Distribution and Sub-transmission Pathway Unit Group	

	∟UETDRSO001 Coordinate high voltage distribution and sub-transmission networks	
	∟UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
	Transmission Pathway Unit Group	
	∟UETDRSO002 Coordinate high voltage transmission network	
	∟UETDRSO004 Develop and evaluate power systems transmission switching programs	
UETDRSO004	Develop and evaluate power systems transmission switching programs	150
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power	

	system organisational WHS/OHS policies, procedures and programs	
UETDRSO005	Develop high voltage distribution and sub-transmission switching programs	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟ UEENEEE104A Solve problems in d.c. circuits	
	∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟ UEENEEE124A Compile and produce an energy sector detailed report	
	∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟ UEENEEE126A Provide solutions to basic engineering computational problems	
	∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟ UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟ UETDREL001 Apply environmental requirements	
	∟ UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRSO006	Develop low voltage distribution switching programs	150
	∟ UEENEED104A Use engineering applications software on personal computers	
	∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRSO011	Respond to discrete and interdependent protection operations	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy	

	sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETDRSO001 Coordinate high voltage distribution and sub-transmission networks	
	∟UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
	Transmission Pathway Unit Group	
	∟UETDRSO002 Coordinate high voltage transmission network	
	∟UETDRSO004 Develop and evaluate power systems transmission switching programs	
UETDRTS004	Commission interdependent network protection and control systems	150
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	

	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRTS010 Develop power systems secondary isolation instructional documents	
	∟UETDRTS017 Maintain interdependent network protection and control systems	
UETDRTS005	Commission power systems metering schemes	150
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	

	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRTS010 Develop power systems secondary isolation instructional documents	
	∟UETDRTS014 Maintain and test and metering schemes	
UETDRTS010	Develop power systems secondary isolation instructional documents	150
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic	

	engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS011	Install and maintain power system communication equipment	150
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	

	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS014	Maintain and test and metering schemes	140
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures	

	and programs ∟ UETDRTS010 Develop power systems secondary isolation instructional documents	
UETDRTS017	Maintain interdependent network protection and control systems ∟ UEENEED104A Use engineering applications software on personal computers ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE104A Solve problems in d.c. circuits ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEE124A Compile and produce an energy sector detailed report ∟ UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟ UEENEEE126A Provide solutions to basic engineering computational problems ∟ UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟ UEENEEG102A Solve problems in low voltage a.c. circuits ∟ UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟ UETDREL001 Apply environmental requirements ∟ UETDREL005 Work safely in the vicinity of live electrical apparatus ∟ UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟ UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟ UETDRTS010 Develop power systems secondary isolation instructional documents	150
UETDRTS018	Maintain, test and commission power systems voltage regulating equipment	150

	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS021	Perform accuracy checks on power systems instrument transformers	150
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	

	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS023	Repair, test and calibrate protection relays and meters	150
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	

	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
	∟UETTDRIS68 Solve problems in energy supply network protection equipment and systems	

UETTDRIS70	Diagnose and rectify faults in electrical energy distribution systems	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
	∟UETTDRIS68 Solve problems in energy supply network protection equipment and systems	
	∟UETTDRIS69 Diagnose and rectify faults in energy supply apparatus	
UETTDRIS72	Diagnose and rectify faults in distributed generation systems	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	

	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟UETTDRIS67 Solve problems in energy supply network equipment ∟UETTDRIS68 Solve problems in energy supply network protection equipment and systems ∟UETTDRIS69 Diagnose and rectify faults in energy supply apparatus	
UETTDRSO45	Operate and monitor system SCADA equipment Common Unit Group ∟UETTDREL15 Respond to power systems technical enquiries and requests	150
UETTDRSO46	Monitor and control the field staff activities To minimise incidents related to safe systems of work, entry into this unit requires at a minimum that an individual has demonstrated or possesses relevant technical engineering discipline competencies of at least AQF level 3. It is intended that an individual will be expected to perform with a large degree of autonomy in decision-making, whilst in an individual environment. This may include immediate response to protect human life, adverse effect on safety, security of supply or the integrity of the assets. NOTE: Typically the following disciplines provide direct entry; electrical or instrumentation, fitting and turning or mechanical trade. Where an individual does not possess or demonstrate the requisite entry requirement, an equivalent bridging program shall be used to ensure equivalence of entry.	150

Group E: Qualification elective units		**Weighting Points**
UETDRDS001	Design customer power system substations Common Unit Group	140

∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UETDREL001 Apply environmental requirements

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Pathway Unit Group 1

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UETDRDS013 Organise and implement ESI line and easement surveys

∟UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure

Pathway Unit Group 2

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

∟UEENEEE126A Provide solutions to basic engineering computational problems

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETDRDS006 Develop high voltage and low voltage

	distribution protection systems	
UETDRSO007	Manage high voltage distribution and sub-transmission network demand	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRSO003 Coordinate power system operations in a regulated energy market	
	∟UETDRSO011 Respond to discrete and interdependent protection operations	

	Distribution and Sub-transmission Pathway Unit Group	
	∟UETDRSO001 Coordinate high voltage distribution and sub-transmission networks	
	∟UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
	Transmission Pathway Unit Group	
	∟UETDRSO002 Coordinate high voltage transmission network	
	∟UETDRSO004 Develop and evaluate power systems transmission switching programs	
UETDRSO008	Manage power systems network faults	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management	

policies & procedures

∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETDRSO003 Coordinate power system operations in a regulated energy market

∟UETDRSO009 Manage power systems transmission networks

∟UETDRSO010 Respond to complex power system protection operations

∟UETDRSO011 Respond to discrete and interdependent protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

∟UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

∟UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Generation/Transmission Pathway Unit Group

∟UETDRSO002 Coordinate high voltage transmission network

∟UETDRSO004 Develop and evaluate power systems transmission switching programs

Distribution and Sub-transmission Pathway Unit Group

∟UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

∟UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

∟UETDRSO007 Manage high voltage distribution and sub-transmission network demand

Transmission Pathway Unit Group

∟UETDRSO002 Coordinate high voltage transmission network

∟UETDRSO004 Develop and evaluate power systems transmission switching programs

∟UETDRSO009 Manage power systems transmission networks

UETDRSO009 Manage power systems transmission networks 180

Common Unit Group

∟UEENEED104A Use engineering applications software on personal computers

∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE124A Compile and produce an energy sector detailed report

∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

∟UEENEEE126A Provide solutions to basic engineering computational problems

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETDREL001 Apply environmental requirements

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETDRSO003 Coordinate power system operations in a regulated energy market

∟UETDRSO011 Respond to discrete and interdependent protection operations

Distribution and Sub-transmission Pathway Unit Group

∟UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

∟UETDRSO005 Develop high voltage distribution and

	sub-transmission switching programs	
	Transmission Pathway Unit Group	
	∟UETDRSO002 Coordinate high voltage transmission network	
	∟UETDRSO004 Develop and evaluate power systems transmission switching programs	
UETDRSO010	Respond to complex power system protection operations	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRSO003 Coordinate power system operations	

	in a regulated energy market	
	∟UETDRSO009 Manage power systems transmission networks	
	∟UETDRSO011 Respond to discrete and interdependent protection operations	
	Generation/Distribution and Sub-transmission Pathway Unit Group	
	∟UETDRSO001 Coordinate high voltage distribution and sub-transmission networks	
	∟UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
	Generation/Transmission Pathway Unit Group	
	∟UETDRSO002 Coordinate high voltage transmission network	
	∟UETDRSO004 Develop and evaluate power systems transmission switching programs	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETDRSO001 Coordinate high voltage distribution and sub-transmission networks	
	∟UETDRSO005 Develop high voltage distribution and sub-transmission switching programs	
	∟UETDRSO007 Manage high voltage distribution and sub-transmission network demand	
	Transmission Pathway Unit Group	
	∟UETDRSO002 Coordinate high voltage transmission network	
	∟UETDRSO004 Develop and evaluate power systems transmission switching programs	
	∟UETDRSO009 Manage power systems transmission networks	
UETDRTS001	Commission complex network protection and control systems	180
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRTS004 Commission interdependent network protection and control systems	
	∟UETDRTS010 Develop power systems secondary isolation instructional documents	
	∟UETDRTS015 Maintain complex network protection and control systems	
	∟UETDRTS017 Maintain interdependent network protection and control systems	
UETDRTS006	Conduct evaluation of power system substation faults	140
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS007	Conduct evaluation of power systems primary plant	160
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic	

	engineering computational problems ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETDREL001 Apply environmental requirements ∟UETDREL005 Work safely in the vicinity of live electrical apparatus ∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETDRTS010 Develop power systems secondary isolation instructional documents	
UETDRTS008	Design power systems secondary isolation instructional documents ∟UEENEED104A Use engineering applications software on personal computers ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟UEENEEE126A Provide solutions to basic engineering computational problems ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits	160

	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETDRTS009	Design testing and commissioning procedures for field devices and substations	140
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system	

	environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	Protection Relays and Meters Pathway Unit Group	
	∟UETDRTS023 Repair, test and calibrate protection relays and meters	
	Metering Pathway Unit Group	
	∟UETDRTS005 Commission power systems metering schemes	
	∟UETDRTS010 Develop power systems secondary isolation instructional documents	
	∟UETDRTS014 Maintain and test and metering schemes	
	Primary Plant Pathway Unit Group	
	∟UETDRTS007 Conduct evaluation of power systems primary plant	
	∟UETDRTS010 Develop power systems secondary isolation instructional documents	
	Protection Systems Pathway Unit Group	
	∟UETDRTS010 Develop power systems secondary isolation instructional documents	
	∟UETDRTS015 Maintain complex network protection and control systems	
	∟UETDRTS017 Maintain interdependent network protection and control systems	
UETDRTS015	Maintain complex network protection and control systems	180
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy	

	sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETDREL001 Apply environmental requirements	
	∟UETDREL005 Work safely in the vicinity of live electrical apparatus	
	∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETDRTS010 Develop power systems secondary isolation instructional documents	
	∟UETDRTS017 Maintain interdependent network protection and control systems	
UETDRTS026	Undertake power systems project management of substation augmentation and maintenance	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for	

problems in complex multiple path circuits

∟UEENEEE126A Provide solutions to basic engineering computational problems

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETDREL001 Apply environmental requirements

∟UETDREL005 Work safely in the vicinity of live electrical apparatus

∟UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Protection Relays and Meters Pathway Unit Group

∟UETDRTS023 Repair, test and calibrate protection relays and meters

Metering Pathway Unit Group

∟UETDRTS005 Commission power systems metering schemes

∟UETDRTS010 Develop power systems secondary isolation instructional documents

∟UETDRTS014 Maintain and test and metering schemes

Primary Plant Pathway Unit Group

∟UETDRTS007 Conduct evaluation of power systems primary plant

∟UETDRTS010 Develop power systems secondary isolation instructional documents

Protection Systems Pathway Unit Group

∟UETDRTS010 Develop power systems secondary isolation instructional documents

∟UETDRTS015 Maintain complex network protection and control systems

∟UETDRTS017 Maintain interdependent network

	protection and control systems	
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟UETTDRIS67 Solve problems in energy supply network equipment ∟UETTDRIS68 Solve problems in energy supply network protection equipment and systems ∟UETTDRIS69 Diagnose and rectify faults in energy supply apparatus	60
UETTDRIS73	Develop engineering solutions for energy supply power transformer problems Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment	60

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

∟UEENEEE126A Provide solutions to basic engineering computational problems

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDRIS67 Solve problems in energy supply network equipment

∟UETTDRIS68 Solve problems in energy supply network protection equipment and systems

∟UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Distribution Pathway Unit Group

∟UETTDRIS70 Diagnose and rectify faults in electrical energy distribution systems

Transmission Pathway Unit Group

∟UETTDRIS71 Diagnose and rectify faults in electrical energy supply transmission systems

Distributed Generation Pathway Unit Group

∟UETTDRIS72 Diagnose and rectify faults in distributed generation systems

Qualification Mapping Information

This qualification replaces and is equivalent to UET60219 Advanced Diploma of ESI - Power Systems

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRAI001 Inspect and test poles at and below ground level

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to inspect and test poles at and below ground level in the electricity supply industry (ESI).

It includes testing poles using invasive or non-invasive methods utilising plant, asset inspection tools and equipment. It also includes analysing and recording testing results.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

or

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Asset Inspection

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect and test pole	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.6 Liaison and communication with stakeholders is carried out in accordance with workplace requirements
	1.7 Work permit/approval is organised in accordance with workplace requirements
	1.8 Worksite is prepared in accordance with the work plan and workplace requirements
	1.9 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out inspection and testing of pole	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Pole is visually inspected at and below ground level in accordance with the work plan and workplace requirements

	2.5 Test equipment is set up and used in accordance with manufacturer's instructions and workplace requirements
	2.6 Test results are analysed and recorded in accordance with workplace requirements
	2.7 Pole is labelled or marked to indicate its condition in accordance with workplace requirements
	2.8 Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1** Completed work is checked for compliance against the work plan and workplace requirements
	3.2 Incidents or unplanned events are reported in accordance with workplace requirements
	3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4 Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5 Work permits are signed off, if applicable, in accordance with workplace requirements
	3.6 Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is not equivalent to UETTDREL18 Inspect and treat poles and inspect electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRAI001 Inspect and test poles at and below ground level

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - manual handling
  - hazardous materials/substances
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- using plant, tools and equipment safely
- visually inspecting poles
- testing poles using at least two (2) of the following methods:
  - sounding
  - drilling
  - resistance
  - ultrasonic/acoustic
  - radiography
  - stress wave
  - dynamic (vibration)
  - mechanical
  - electromagnetic field
- using software applications or workplace documents for:
  - accessing and verifying existing data
  - capturing or recording data
  - analysing and recording results
- indicating pole condition by labelling/marking
- dealing with an unplanned event on at least one (1) occasion
- organising relevant work permits/approvals

- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - manual handling
  - hazardous materials/substances
  - visual inspection requirements
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits/approvals
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- poles, including:
  - types
  - characteristics
  - types of defects
- electricity network construction types
- pole testing methods and procedures
- test equipment, including:
  - types
  - selection
  - operation and characteristics
  - calibration
  - handling
  - maintenance
  - storage
- procedures for interpretation and recording of results
- pole marking/labelling requirements
- reporting requirements
- software applications and/or data capturing documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used to inspect and test poles at and below ground level
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRAI002 Inspect poles, hardware and electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to inspect poles, hardware and electrical apparatus in the electricity supply industry (ESI).

It includes visual inspection of poles above ground, overhead conductors and/or cables, underground and overhead transition points, pole-mounted transformers, switchgear, hardware and/or earthing systems.

It also includes identifying and reporting defects.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

Competency Field

Asset Inspection

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

outcomes.	demonstrate achievement of the element.
1 Prepare to inspect poles, hardware and electrical apparatus	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Plant, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.6 Liaison and communication with stakeholders is carried out in accordance with workplace requirements
	1.7 Worksite is prepared in accordance with the work plan and workplace requirements
	1.8 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Inspect poles, hardware and electrical apparatus	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Working at heights and the use of plant, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Poles, hardware and electrical apparatus are visually inspected in accordance with the work plan and workplace requirements
	2.5 Pole, hardware and electrical apparatus inspection results are recorded
	2.6 Incidents or unplanned events are responded to in accordance with workplace requirements

3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit. No equivalent unit.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRAI002 Inspect poles, hardware and electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and industry and workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- visually inspecting poles, hardware and electrical apparatus
- identifying pole, hardware and electrical apparatus defects
- using software applications or workplace documents for:
  - accessing and verifying existing data
  - capturing or recording data
  - categorising and recording defects
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - visual inspection requirements
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant and equipment

- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- poles, including:
  - types
  - characteristics
  - defects
- hardware, including:
  - types
  - characteristics
  - defects
- electrical apparatus, including:
  - types
  - characteristics
  - defects
- electricity networks, including:
  - construction types
  - identification of low voltage (LV)
  - identification of high voltage (HV)
  - clearances for overhead conductors, cables and structures
  - vegetation clearance profiles
- identification and categorisation of defects
- procedures for recording inspection results
- software applications and/or data capturing documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for inspecting poles, hardware and electrical apparatus
- applicable documentation, including workplace requirements, relevant industry standards,

equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRAI003 Perform minor maintenance on electricity network assets

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to perform minor maintenance on electricity network assets in the electricity supply industry (ESI).

It includes signage/labels, cover plates/guards/strips, minor vegetation control and completing workplace documentation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

Competency Field

Asset Inspection

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Prepare to perform minor maintenance	**1.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4	Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.5	Hazards are identified, risks assessed and control measures identified and applied
	1.6	Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7	Work permit/approval is organised in accordance with workplace requirements
	1.8	Liaison and communication with stakeholders is carried out in accordance with workplace requirements
	1.9	Worksite is prepared in accordance with the work plan and workplace requirements
	1.10	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Perform minor maintenance	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Minor vegetation control is performed in accordance with the work plan and workplace requirements
	2.5	Minor maintenance is performed on electricity network assets in accordance with the work plan and workplace

	requirements
	2.6 Incidents or unplanned events are responded to in accordance with workplace requirements
	2.7 Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1** Completed work is checked for compliance against the work plan and workplace requirements
	3.2 Incidents or unplanned events are reported in accordance with workplace requirements
	3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4 Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.7 Work permits are signed off, if applicable, in accordance with workplace requirements
	3.8 Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL20 Undertake minor vegetation control and routine minor maintenance of poles and electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRAI003 Perform minor maintenance on electricity network assets

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- performing minor vegetation control
- performing minor maintenance on electricity network assets
- organising relevant work permits/approvals
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice, and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - records, reports and documentation procedures
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of work permits/approvals
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident

- minor vegetation control procedures
- types and procedures for minor maintenance on electricity network assets.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used to perform minor maintenance on electricity network assets
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRAI004 Treat poles

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to treat poles in the electricity supply industry (ESI).

It includes the types, handling and usage, transporting, storing and disposing of pole treatment applications.

It also includes environmental requirements and the completion of work documentation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

Competency Field

Asset Inspection

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Prepare to treat poles	**1.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for work to be performed are referred to and confirmed
	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4	Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5	Hazards are identified, risks assessed and control measures identified and applied
	1.6	Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7	Worksite is prepared in accordance with the work plan and workplace requirements
	1.8	Liaison and communication with stakeholders is carried out in accordance with workplace requirements
	1.9	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Apply treatment to poles	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Treatment of poles is performed in accordance with work plan and workplace requirements
	2.5	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements

3.2 Incidents or unplanned events are reported in accordance with workplace requirements

3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements

3.4 Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

3.6 Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit. No Equivalent Unit.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRAI004 Treat poles

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - environmental requirements
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- applying treatment applications to at least two (2) of the following pole types:
  - wood
  - steel
  - concrete
  - composite
- handling, transporting, storing and disposing of treatment applications
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice, and organisational workplace requirements, including:
  - WHS/OHS
  - environmental
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident

- procedures for work records, reports and documentation
- treatment applications, including:
  - types and characteristics
  - safe handling and application
  - storage
  - transport
  - disposal.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used to treat poles
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRAI005 Use asset inspection equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to use asset inspection equipment in the electricity supply industry (ESI).

It includes selecting and using asset inspection equipment to identify the condition of above ground overhead assets.

It also includes interpreting and recording information from asset inspection equipment.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

Competency Field

Asset Inspection

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Prepare to use asset inspection equipment	**1.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Tools, equipment and personal protective equipment (PPE) required for are determined, obtained and confirmed in working order
	1.4	Hazards are identified, risks assessed and control measures identified and applied
	1.5	Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.6	Liaison and communication with stakeholders is carried out in accordance with workplace requirements
	1.7	Worksite is prepared in accordance with the work plan and workplace requirements
	1.8	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Use asset inspection equipment	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Asset inspection equipment is used in accordance with manufacturer instructions and workplace requirements
	2.5	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements

3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements

3.4 Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.5 Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL17 Operate asset inspection machinery and equipment near live electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRAI005 Use asset inspection equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- selecting, inspecting, using and storing asset inspection equipment
- interpreting and recording inspection results
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice, and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - working safely with asset inspection equipment
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- asset inspection equipment, including:
  - types

- selection
- operation and characteristics
- calibration
- handling
- maintenance
- storage

- procedures for interpretation and recording of results.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate tools, equipment and PPE currently used for asset inspection
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice, operator manuals and manufacturer manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDO001 Inspect overhead poles, structures and electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to inspect overhead poles, structures and electrical apparatus in the electricity supply industry (ESI).

It includes visual inspection of poles and structures above ground, overhead conductors and cables, underground to overhead transition points, electrical apparatus, hardware and earthing systems.

It also includes identifying and reporting defects.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect overhead poles, structures, and electrical apparatus	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.6 Liaison and communication with stakeholders is carried out in accordance with workplace requirements
	1.7 Worksite is prepared in accordance with the work plan and workplace requirements
	1.8 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Inspect overhead poles, structures and electrical apparatus	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Poles, structures and electrical apparatus are visually inspected in accordance with the work plan and workplace requirements
	2.5 Inspection results are recorded in accordance with

		workplace requirements
	2.6	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDP11 Inspect overhead poles-structures and electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDO001 Inspect overhead poles, structures and electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- visually inspecting poles, structures and electrical apparatus
- identifying, categorising and recording defects
- undertaking inspections using at least one (1) of the following:
  - ground
  - vehicle
  - helicopter
  - fixed wing
  - remotely piloted aircraft (RPA)
  - elevated work platform (EWP)
  - ladder
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - visual inspection requirements

- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- poles, including:
  - types
  - characteristics
  - defects
- hardware, including:
  - types
  - characteristics
  - defects
- electrical apparatus, including:
  - types
  - characteristics
  - defects
- electricity networks, including:
  - construction types
  - identification of low voltage (LV)
  - identification of high voltage (HV)
  - clearances for overhead conductors, cables and structures
- identification and categorisation of defects
- procedures for recording inspection results.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for inspecting overhead poles, structures and electrical apparatus

- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDO002 Inspect, maintain and restore energised low voltage overhead distribution network infrastructure

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the inspection of overhead structures, such as poles and/or other structures other than towers, and the maintenance of overhead energised low voltage (LV) conductors and cables. It includes the conducting of LV switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule in accordance with enterprise procedures. It covers LV distribution systems in field situations but also includes paralleling in accordance with the switching schedule.

It also includes inspection of electrical apparatus, such as overhead conductors and/or cables, underground and overhead transition points, electrical equipment, such as pole-mounted transformers, switchgear, hardware and/or earthing systems. It encompasses the completion of inspection reports and other relevant documentation in accordance with requirements.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRIS009 Install and maintain ESI network infrastructure electrical equipment

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Distribution Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for the inspection, maintenance and restoration of overhead distribution network	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection

infrastructure

1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the inspection of overhead structures and electrical apparatus used on poles and/or structures, the maintenance of overhead energised LV conductors and cables and LV switching, are obtained and confirmed for the purposes of the work to be performed and communicated

1.4 Physical loads and calculations are confirmed according to requirements using essential knowledge and appropriate skill

1.5 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures

1.6 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear according to established procedures

1.7 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures

1.8 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order

1.9 Specialist equipment for live work is inspected and confirmed in working order in accordance with requirements and established procedures

1.10 Relevant personnel at worksite are confirmed current in first aid, pole top rescue and other related work procedures according to requirements

1.11 Liaison and communication issues with other/authorised personnel, authorities, clients and landowners are resolved to carry out work where necessary

	1.12	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.13	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures
	1.14	Traffic management plan is identified and implemented
2 Carry out inspection, maintenance and restoration of overhead distribution network infrastructure	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed, and currency according to requirements is confirmed
	2.3	Essential knowledge and associated skills are applied in the safe maintenance and restoration of overhead distribution network infrastructure to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.4	Inspection of overhead structures and electrical apparatus used on poles and/or structures is carried out in accordance with the work schedule and requirements/established procedures
	2.5	Maintenance, including repair and/or replacement of poles and/or structures, is carried out in accordance with the work schedule and requirements/established procedures
	2.6	Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures
	2.7	Electrical equipment and associated circuits line/network or worksite to be switched, including paralleling, is isolated and proved de-energised using appropriate devices and earthed, where required, according to requirements and established procedures
	2.8	Hazard warnings and safety signs are recognised and

		hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.9	Unplanned events during the inspection, maintenance or switching procedures are undertaken within the scope of established procedures
	2.10	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.11	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the inspection, maintenance and restoration of overhead distribution network infrastructure	**3.1**	Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures
	3.5	Relevant work permits are signed off and overhead structures and electrical apparatus used on poles and/or structures are returned to service in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDP15 Inspect, maintain and restore energised low voltage overhead distribution network infrastructure.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDO002 Inspect, maintain and restore energised low voltage overhead distribution network infrastructure

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- inspecting three (3) of the following overhead structures and electrical apparatus:
  - poles and structures
  - overhead conductors/cables
  - underground/overhead transition points
  - electrical equipment
  - hardware
  - earthing systems
- conducting inspections using at least one (1) of the following:
  - ground
  - vehicle
  - helicopter
  - fixed wing
- using at least two (2) of the following inspection techniques:
  - visual*
  - infra-red camera
  - X-ray
  - camera
  - (*must do)
- maintaining at least two (2) of the following overhead energised low voltage (LV) conductors and cables:
  - copper
  - aluminium

  - aluminium steel
  - steel
  - pilot
- using at least two (2) of the following access equipment:
  - elevated work platform (EWP)
  - ladder
  - portable platform
- using all of the following live LV working equipment:
  - insulating mats/sleeves
  - temporary bridging device
  - insulating gloves
  - insulated cable tensioning devices
  - ladder/pole shrouds
  - equipotential bonding
- using at least three (3) of the following testing and recording devices:
  - voltage detector*
  - clamp-on ammeter
  - polarity tester
  - insulation resistance tester
  - phase sequence indicator
  - recording meters
  - (*must do)
- performing LV switching to a given schedule and incorporating all of the following:
  - approvals/clearances
  - access authority/permits
- incorporating two (2) of the following:
  - voltage detectors
  - polarities testers
  - phase rotation indicators
- operating at least one (1) of the following switchgear types:
  - LV links
  - LV bridges
  - LV fuses
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- powerline safety practices encompassing:

- protective apparatus and apparel for linework:
  - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel
  - types of protective apparatus and apparel used for the line worker
- requirements for the use of ladders:
  - carrying, erecting, collapsing and lowering different types of extension ladders against a standing pole
  - maintenance checks on different types of ladders
  - renewal of extension ropes
  - safety issues relating to clearances from overhead conductors
- requirements for climbing and working aloft:
  - methods used to identify a pole is safe to climb
  - methods used to inspect a line worker's body belt
  - application of knots and hitches appropriate to the requirements of a line worker
  - height safety principles, including personal fall protection, prevention and related requirements
  - practical procedures of climbing an overhead structure and fitting a pole chair
- traffic management:
  - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements
  - procedures used to provide an effective traffic management scheme and the use of a two-way radio
- control of small fires:
  - identification, selection and operation of the appropriate extinguishing mediums for various types of fires
  - general fire prevention methods
  - precautions for personal protection when fighting small fires
- rescue victims from heights and confined spaces:
  - planning, identifying and establishing procedures and responses
  - developing techniques
  - involvement of external emergency services
  - emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
- requirements for aerial linework:
  - planning, establishing and implementing relevant aviation authority clearances
  - determining system requirements
  - aircrew familiarisation with network operations and equipment
  - requirements for effective communications operations for aerial work
- LV - energised LV equipment working practices for substations encompassing:
  - standards, codes, Commonwealth, state/territory/local government legislation, supply authority regulations and/or enterprise requirements

- safety precautions specific to working on or near energised LV conductors:
  - safe working practices and procedures
  - identification of hazards
  - assessment and control of WHS/OHS risks
  - types, selection, maintenance and use of personal protective equipment (PPE)
- work on or near energised LV conductors:
  - types and function of specialised tools
  - safe working practices when using specialised tools
  - methods of using specialised tools
  - safe procedures for work on panels and in cubicles on or near energised LV conductors
  - release and rescue procedures for work on or near exposed energised LV conductors
- poles and structures inspection principles encompassing:
  - standards, codes, legislation, supply authority regulations and or enterprise requirements
  - characteristics of wood used for structures within the electrical distribution system:
    - relationship between timber and water
    - faults that occur that influence the integrity of the structure
    - effects of fungal activity, termite and borer activity and dry rot
  - chemical treatment principles:
    - types of chemical used to treat timber
    - regulations and procedures in handling and transporting chemicals safely
    - application procedures of chemicals to wood
  - deterioration prevention techniques:
    - relationship between steel, concrete and wood
    - inspection procedures for deterioration
    - deterioration prevention procedures in steel, concrete and wood
    - procedures for the repair of deterioration in steel, concrete and wood
- powerline inspection principles encompassing:
  - standards, codes, legislation, supply authority regulations and or enterprise requirements
  - ground line inspection procedures of electrical distribution structures:
    - requirements for pole inspection on electrical distribution structures
    - use of specific equipment and testing devices during testing/inspection
    - methods of recording data
  - overhead line inspection procedures of electrical distribution structures:
    - methods and requirements for overhead line inspection on electrical distribution structures
    - clearances for overhead conductors, cables and structures
    - use of specific equipment and testing devices during testing/inspection
    - methods of recording data
  - underground cable inspection procedures in the electrical distribution system:

- state/territory industry policy and regulations
- methods and requirements for line inspection on underground cable terminations

- installation of switchgear and associated equipment encompassing:
  - types and function of various switchgear:
    - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches and circuit breakers
    - operating characteristics, advantages and disadvantages of different types of switchgear
    - installation procedures, earthing requirements and techniques
  - types of equipment:
    - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
  - installation procedures for switchgear and equipment:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements
    - assembly and erecting procedures
    - earthing requirements and techniques
    - pole mounted locations
  - maintenance procedures for switchgear and equipment:
    - diagnosing and rectifying faults according to electricity supply industry (ESI) standards and procedures
  - testing and commissioning:
    - ESI standards and procedures
- LV switching principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings:
    - types, characteristics and capabilities of electrical apparatus
    - use, characteristics and capabilities of specialised tools and testing equipment
    - LV network interconnectors source of possible backfeed
  - LV switching techniques:
    - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
  - PPE for LV switching.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDO003 Maintain energised high voltage distribution overhead electrical apparatus (glove and barrier)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain energised high voltage (HV) overhead electrical apparatus using glove and barrier in the electricity supply industry (ESI).

It includes gaining network access approval, verifying site conditions and potential hazards, calculating physical loads and selecting appropriate work techniques.

It also includes preparing, using and maintaining specialised insulated tools and equipment.

This unit is subject to the following requirements for entry:

- *Certificate III in ESI - Distribution Overhead - powerline worker qualification or equivalent.*

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Not applicable, refer to unit application.

Competency Field

Distribution Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to maintain energised HV distribution overhead electrical apparatus (glove and barrier)	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Loads/forces are calculated in accordance with workplace requirements
	1.5 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.6 Hazards are identified, risks assessed and control measures identified and applied
	1.7 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.8 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.9 Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.10 Work permit/approval is organised in accordance with workplace requirements
	1.11 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.12 Worksite is prepared in accordance with the work plan and workplace requirements
	1.13 Traffic management plan is confirmed as being in place in accordance with workplace requirements

2 Carry out maintenance of energised HV distribution overhead electrical apparatus (glove and barrier)	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Work permit/approval is obtained to commence the work in accordance with workplace requirements
	2.5	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.6	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.7	Safe approach distances are maintained when the work is being performed
	2.8	Energised HV distribution overhead electrical apparatus is installed and maintained in accordance with the work plan and workplace requirements
	2.9	Work permit/approval is cancelled or relinquished in accordance with workplace requirements
	2.10	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.11	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace

requirements

3.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

3.6 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDP14 Maintain energised HV distribution overhead electrical apparatus (glove).

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDO003 Maintain energised high voltage distribution overhead electrical apparatus (glove and barrier)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- installing/replacing all of the following:
  - structure
  - cross-arm
  - strain insulator
  - pin insulator
  - connecting bridge/bonding connections
- installing/maintaining at least four (4) of the following:
  - pole mounted reclosers
  - air brake switches
  - high voltage (HV) links/disconnects
  - temporary HV links/HV fuses
  - expulsion drop-out fuses
  - lightning arrestors
  - conductors
  - vibration dampers, line splices, armour rods or aircraft warning markers
- working from an approved elevated work platform (EWP)
- using at least one (1) of the following testing and recording devices:
  - amp meter

  - insulation test equipment
  - leakage detector
  - voltage detector
- dealing with an unplanned event on at least one (1) occasion
- organising, issuing, cancelling or relinquishing relevant work permits/approvals in accordance with workplace requirements
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice, and organisational workplace requirements, including:
  - WHS/OHS
  - live work up to and including 33 kV HV glove and barrier principles, techniques and procedures
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of work permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety precautions for HV live distribution glove and barrier work, including:
  - minimum approach distances/safe approach distances
  - effects of excessive conductor temperature on insulating equipment
  - types and application of PPE
  - integrity of insulation
  - emergency response, first aid and rescue
  - disabling auto-reclose function
  - network access and communication
- definition of terms for HV live work glove and barrier method
- mobile plant, including:
  - types
  - care and maintenance
  - frequency of testing
  - earthing
- insulated barriers, sticks, tools and equipment, including:
  - types, construction and characteristics
  - application
  - care and maintenance

    - frequency of testing
- gloves and sleeves, including:
    - types, construction and characteristics
    - application
    - care and maintenance
    - frequency of testing
- operational use of plant, sticks, tools and equipment, including:
    - conductor support
    - selecting conductor support method
    - calculation of loads
    - effects of secondary loadings/forces
    - effects of resultant forces
    - conductor support rigging procedures
- safety observer:
    - role and responsibilities
    - communication methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry to maintain energised HV distribution overhead electrical apparatus (glove and barrier)
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDO004 Maintain energised high voltage distribution overhead electrical apparatus (stick)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain energised high voltage (HV) distribution overhead electrical apparatus using stick method in the electricity supply industry (ESI).

It includes gaining network access approval, verifying site conditions and potential hazards, calculating physical loads and selecting appropriate work techniques.

It also includes preparing, using and maintaining specialised insulated tools and equipment.

This unit is subject to the following requirements for entry:

- *Certificate III in ESI - Distribution Overhead - powerline worker qualification or equivalent.*

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Not applicable, refer to unit application.

Competency Field

Distribution Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to maintain energised HV distribution overhead electrical apparatus (stick)	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Loads/forces are calculated in accordance with workplace requirements
	1.5 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.6 Hazards are identified, risks assessed and control measures identified and applied
	1.7 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.8 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.9 Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.10 Work permit/approval is organised in accordance with workplace requirements
	1.11 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.12 Worksite is prepared in accordance with the work plan and workplace requirements
	1.13 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out maintenance of energised HV distribution	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to

overhead electrical apparatus (stick)		be performed are applied and monitored
	2.2	Lifting, climbing, working at heights and the use of plant tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Work permit/approval is obtained to commence the work in accordance with workplace requirements
	2.5	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.6	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.7	Safe approach distances are maintained when the work is being performed
	2.8	Energised HV overhead electrical apparatus is installed and maintained in accordance with work plan and workplace requirements
	2.9	Work permit/approval is cancelled or relinquished in accordance with workplace requirements
	2.10	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.11	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of

in accordance with workplace requirements

3.6 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDP13 Maintain energised HV distribution overhead electrical apparatus (stick).

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDO004 Maintain energised high voltage distribution overhead electrical apparatus (stick)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- installing/replacing all of the following:
  - structure
  - cross-arm
  - strain insulator
  - pin insulator
  - connecting bridge/bonding connections
- installing/maintaining at least two (2) of the following:
  - pole mounted reclosers
  - air brake switches
  - high voltage (HV) links/disconnects
  - temporary HV links/HV fuses
  - expulsion drop-out fuses
  - lightning arrestors
  - vibration dampers, line splices, armour rods or aircraft warning markers
- working from at least two (2) of the following:
  - elevated work platform (EWP)
  - ladder
  - pole platform
  - structure
- using at least one (1) of the following testing and recording devices:

  - amp meter
  - insulation test equipment
  - leakage detector
  - voltage detector
- dealing with an unplanned event on at least one (1) occasion
- organising, issuing, cancelling or relinquishing relevant work permits/approvals in accordance with workplace requirements
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - live work up to and including 66 kV HV stick principles, techniques and procedures
- hazard, risk assessment and risk control requirements, including potential hazards
- safe use of plant, tools and equipment
- application, purpose and types of work permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety precautions for HV live distribution stick work, including:
  - minimum approach distances/safe approach distances
  - effects of excessive conductor temperature on insulating equipment
  - types and application of PPE
  - integrity of insulation
  - emergency response, first aid and rescue
  - disabling auto-reclose function
  - network access and communication
- definition of terms for HV live work stick method
- mobile plant, including:
  - types
  - care and maintenance
  - frequency of testing
  - earthing
- insulated sticks, tools and equipment, including:
  - types, construction and characteristics
  - application
  - care and maintenance

  - frequency of testing
- operational use of plant, sticks, tools and equipment, including:
  - conductor support
  - selecting conductor support method
  - calculation of loads
  - effects of secondary loadings/forces
  - effects of resultant forces
  - conductor support rigging procedures
- safety observer:
  - role and responsibilities
  - communication methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry to maintain energised HV distribution overhead electrical apparatus (stick)
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDO005 Maintain overhead energised low voltage distribution network

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to maintain overhead energised low voltage (LV) distribution network in the electricity supply industry (ESI).

It includes maintaining cables and conductors, replacing poles and hardware, using specialised equipment, undertaking electrical tests and completing documentation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

Competency Field

Distribution Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain overhead energised LV distribution network	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Resources, including plant, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.7 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.8 Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.9 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.10 Worksite is prepared in accordance with the work plan and workplace requirements

	1.11	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out maintenance of overhead energised LV distribution network	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Overhead energised LV conductors and cables are maintained in accordance with workplace requirements
	2.8	Overhead LV structure is maintained in accordance with workplace requirements
	2.9	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.10	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

3.6 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDP12 Maintain overhead energised low voltage conductors and cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDO005 Maintain overhead energised low voltage distribution network

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- repairing and joining energised overhead low voltage (LV) conductors and cables
- connecting and terminating conductors and cables in accordance with workplace requirements
- completing at least four (4) of the following energised LV tasks:
  - replacing strain cross arm*
  - replacing intermediate cross arm
  - conversion from intermediate to strain, or strain to intermediate
  - replacing pole
  - replacing insulator
  - installing/replacing bridge/tap
  - replacing LV isolators/links/disconnector/s
  - (*must do)
- working on energised LV from at least two (2) of the following:
  - elevated work platform (EWP)
  - ladder
  - portable platform
- using at least four (4) of the following specialised energised LV equipment:
  - insulating mats/sleeves
  - temporary bridging device
  - insulating gloves

  - tensioning devices
  - pole shrouds
- performing at least two (2) of the following LV tests:
  - polarity and loop impedance
  - phasing
  - neutral identification
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safe work practices and procedures for working on or near energised LV
- insulating gloves, including:
  - types, construction and characteristics
  - application
  - care and maintenance
  - testing
- specialised tools and equipment, including:
  - types, construction and characteristics
  - application
  - care and maintenance
  - testing
- conductor support:
  - selecting conductor support method
  - calculation of loads
  - effects of secondary loadings/forces
- safety observer:
  - role and responsibilities
  - communication methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for maintaining overhead energised LV distribution networks
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDO006 Maintain, test and verify distribution overhead network

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit consolidates critical knowledge and skills developed throughout the term of the qualification to maintain, test and verify distribution overhead network installations in the electricity supply industry (ESI).

It includes maintaining energised low voltage (LV) distribution overhead network installations.

It also includes testing and verifying network circuits, electrical apparatus and customer connections for compliance with the work plan and workplace requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDRDO001 Inspect overhead poles, structures and electrical apparatus

UETDRDO005 Maintain overhead energised low voltage distribution network

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS008 Install and maintain electrical apparatus

UETDRIS010 Install and maintain low voltage overhead services

UETDRIS012 Install and maintain poles, structures and hardware

Competency Field

Distribution Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain, test and verify overhead distribution network	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Safe approach distances for the work are determined and confirmed in accordance with the work plan and workplace requirements
	1.7 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.8 Communication method between the workers and safety observer is determined and confirmed in accordance

		with workplace requirements
	1.9	Work permits are received and signed in accordance with workplace requirements
	1.10	Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.11	Equipment for testing and verification is determined, inspected, confirmed in working order and calibrated in accordance with workplace requirements
	1.12	Worksite is prepared in accordance with the work plan and workplace requirements
	1.13	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out maintenance of overhead distribution network	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer in position to observe the work in accordance with workplace requirements
	2.5	Safe approach distances are maintained when the work is being performed
	2.6	Communication method between workers and safety observer is used in accordance with workplace requirements
	2.7	Overhead energised LV structure is maintained in accordance with workplace requirements
	2.8	Overhead electrical apparatus is maintained in accordance with workplace requirements
	2.9	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Test and verify overhead distribution network	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to

		be performed are applied and monitored
	3.2	Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	3.5	Safe approach distances are maintained when the work is being performed
	3.6	Communication method between workers and safety observer is used in accordance with workplace requirements
	3.7	Overhead distribution network installations are tested for compliance in accordance with workplace requirements
	3.8	Overhead distribution network installations are inspected for compliance in accordance with workplace requirements
	3.9	Inspection and test results are recorded in accordance with workplace requirements
	3.10	Incidents or unplanned events are responded to in accordance with workplace requirements
4 Complete work and documentation	**4.1**	Incidents or unplanned events are reported in accordance with workplace requirements, as required
	4.2	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.3	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.4	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.5	Work permits are signed off in accordance with workplace requirements
	4.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDP99 Test and verify distribution overhead installations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDO006 Maintain, test and verify distribution overhead network

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant plant, tools, equipment and personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- selecting, inspecting and using specialised tools and equipment
- maintaining energised low voltage (LV) distribution overhead network installations including at least one (1) of the following:
  - strain cross arm replacement
  - intermediate cross arm replacement
  - conversion from intermediate to strain
- testing electrical apparatus, including:
  - insulation resistance
  - earth resistance
  - voltage
- testing network circuit including at least three (3) of the following:
  - phasing*
  - neutral identification
  - phase rotation
  - loop impedance
  - voltage
  - current
  - earthing systems
  - (*must do)

- testing consumer/customer connections including at least five (5) of the following:
  - neutral integrity*
  - polarity*
  - voltage
  - current
  - phase rotation
  - insulation resistance
  - neutral identification
  - loop impedance
  - earth resistance
  - (*must do)
- inspecting overhead distribution network installation for compliance
- recording test results in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - network circuit testing
  - electrical apparatus testing
  - customer/consumer connection testing
  - maintenance procedures for energised LV overhead distribution network
  - capture and record test results
  - work records, reports and documentation
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and specialised equipment
- application, purpose and types of work permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for maintaining, testing and verifying distribution overhead network
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS001 Design customer power system substations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the design of basic primary and secondary plant within a customer substation. Such designs will usually include relay-operated high voltage (HV) switchgear, distribution transformers, low voltage (LV) switchgear, including customer distribution boards. The design may include minor civil engineering aspects and must conform to relevant Australian Standards, safety regulations, environmental standards and customer requirements taking into account costs as an important criterion.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Pathway Unit Group 1

UEENEEE104A Solve problems in d.c. circuits

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDRDS013 Organise and implement ESI line and easement surveys

UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure

Pathway Unit Group 2

UEENEEE104A Solve problems in d.c. circuits

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDRDS006 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for and coordinate the design of customer substations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of customer substations, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established with appropriate personnel

	1.4	Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the design of customer substations	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Substation design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the customer substation are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures

	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of customer substations	**3.1**	Final inspections of the design are undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS50 Design customer power system substations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS001 Design customer power system substations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing six (6) designs in total drawn from at least two (2) of the following project types:
  - single transformer substations
  - multi-transformer substations
  - upgrade/alteration to existing assets
  - auto-changeover systems
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- substations and power transformers encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of high voltage (HV) equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault-finding procedures
  - characteristics of reactors - description and purpose
- installation of metering and control equipment encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment

- types of meters - kilowatt-hour meters, single and polyphase, demand meters, recording meters and electronic recording metering system summators
- installation and removal methods - direct connection and plug in method, and enterprise specific
- types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch and audio frequency injection relay
- testing procedures - safety and polarity testing

- HV distribution transformer principles encompassing:
  - operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer - cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults
  - HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers
- feeder automation system encompassing:
  - function of feeder automation system and the main components
  - operation procedure for a remote field device from a local control station
  - functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
  - SCADA system security interlocks and access restrictions
  - SCADA system operation when switching apparatus or retrieving data via a remote access device, such as remote access terminal (RAT), dial up voice annunciated system and local control station
  - function of the main components of a local/remote control system
  - operation of a field devices using SCADA systems via a RAT, dial up annunciated system and local control station
- layout principles for a distribution substation minor upgrade encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to a distribution substation minor upgrade
  - requirements for the use of distribution substation minor upgrade construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, and costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length

  - resources needed for the laying of conductors, cables and equipment
  - determining the appropriate installation sequence
  - minimum clearances between conductors and equipment
  - estimation of the duration of underground distribution extension project
- fundamentals of distribution transformers encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the safe operation and testing of distribution transformers and auxiliary equipment
  - drawing layouts, conventions and symbols - vector group of transformers and three phase transformers
  - construction of a distribution transformer
  - characteristics when operated under load and no-load conditions
  - percentage impedance determinations by test and calculation
  - function and operation of tap charging switches, including solid state tap changing equipment
  - function and operation of transformer auxiliary equipment
  - problems caused by harmonics in transformers
  - methods and equipment used to overcome harmonics in transformers
- testing procedures of distribution transformers encompassing:
  - safety precautions specific to the testing of distribution transformers
  - procedures for safely connecting distribution transformers for testing
  - testing of distribution transformers to determine losses
  - calculation of transformer efficiency
  - methods and types of equipment used to cool transformers - properties of transformer oil and tests performed on transformer oil
  - techniques in performing selected tests on transformer oil
  - techniques in performing testing procedures on armer
  - techniques in testing distribution transformers
  - distribution transformer parallel connections - conditions and restrictions for parallel operations and calculations of loading on transformers operating in parallel
  - connection of transformer in parallel to supply a common load.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry to design customer substations
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS002 Design overhead distribution power systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the technical design of overhead distribution and sub-transmission networks to relevant standards, including electrical clearances, electrical and mechanical loadings, earthing, environmental considerations, minor civil aspects and the handling of waterway, railway and other crossings. It also includes the necessary established procedures to ensure the line design conforms to specific organisational technical standards, operational and system planning requirements, and incorporates the principles of safe design.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Pathway Unit Group 1

UETDRDS013 Organise and implement ESI line and easement surveys

UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure

Pathway Unit Group 2

UETDRDS006 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for and coordinate the safe design of overhead distribution systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of overhead distribution systems, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures

	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the safe design of overhead distribution systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate

		authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the safe design of overhead distribution systems	**3.1**	Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS35 Design overhead distribution power systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS002 Design overhead distribution power systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing six (6) compliant technical designs of an overhead distribution or sub-transmission system with at least one relating to each of the following project types:
  - multi-pole extensions
  - in-line pole relocations
  - multi-circuit overhead lines
- completing designs, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- mathematical techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
  - identification of basic concepts, principles and applications:
    - application of velocity, acceleration, force, density, torque and pressure
  - application of the International System of Units (SI) units

- the relationship between work, power and energy
- behaviour of object under force:
  - using a block and tackle under load
  - concept of mechanical advantage
  - determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- fundamentals of the basic laws of fluid mechanics

- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications:
    - properties of tensile strength
    - effects of temperature on the expansion of metals
    - ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers
- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
    - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors:
    - types of low voltage (LV) and high voltage (HV) overhead electrical conductor connections
    - causes and effects of poor electrical connections
    - reasons for and methods used to maintain standard phase sequencing
    - removing, repairing and replacing of damage conductors
    - minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation:
    - types and application of tools, equipment and hardware
    - methods of stringing, tensioning and termination of LV and HV conductors
- installation of poles and/or structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - characteristics and applications of different types of poles and associated hardware
  - techniques for installing poles and associated hardware:
    - types of installation equipment/tools
    - excavation methods

        - types of footings/foundations, types of attachments
        - earthing systems
        - clearances between conductors
        - safe methods of erecting and stabling poles and/or structures and cross-arms
    - techniques for maintenance of poles and associated hardware:
        - stabilisation techniques for unstable poles
        - methods of strengthen poles
        - maintenance and replacement of HV insulators and cross-arms
- installation of metering and control equipment encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
    - types of meters:
        - kilowatt-hour meters single and polyphase
        - demand meters, recording meters and electronic recording metering systems summators
    - installation and removal methods:
        - direct connection and plug in method
        - enterprise specific
    - types of associated equipment and accessories:
        - meter boards, service fuse, links, contactors, time switch and audio frequency injection relay
    - testing procedures:
        - safety testing
        - polarity testing
- different types and function of distribution components encompassing:
    - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
    - types, function and characteristics of distribution components
    - safety policies and procedures precautions related to the handling and installing of distribution components
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV systems
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV single wire earth return (SWER) system encompassing:
    - application and function of SWER system components

- circuit arrangement
- principle of operation
- hazards and procedures associated with faulty SWER earth systems
- procedure to isolate, energise and commission SWER substations

- power distribution network documentation encompassing:
  - requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types and application of power distribution network documentation drawings and documents:
    - wiring and schematic diagrams
    - drawings and switching symbols
    - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different diagrams and documentation on LV and HV systems:
    - overhead distribution extensions
    - underground distribution extensions
    - distribution substations
    - street lighting systems
- layout principles for overhead distribution encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to overhead distribution layout
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components such as equipment, poles and cross-arms
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - resources needed for the stringing and maintenance of conductors
  - types of LV and HV overhead electrical conductor connections
  - minimum clearances between overhead conductors and LV and/HV structures
  - estimation of the duration of overhead distribution extension project
- system components and layouts encompassing:
  - distribution system layouts:
    - overhead/underground, urban/rural, HV customers, high-rise building systems, three phase lines, single phase lines, SWER systems, spur, parallel and ring systems, typical substation types

- transmission system layouts:
  - lines, buses, transformers and cables, line/bus layouts including single, double, ring and breaker and half systems, and HV crossing methods
- alternating current (AC) transmission system components encompassing:
  - support structures and reasons for selection
  - insulators and reasons for selection
  - conductors and reasons for selection
  - vibration management systems and principles
  - line ratings based on voltage, span, tension and temperature
- AC transmission line electrical parameters encompassing:
  - typical arrangements
  - parameters of significance
  - calculation of line parameters:
    - calculation of resistive, inductive and capacitive values assuming regular transposition and solid conductors
  - comparison with actual values
  - typical parameter values and ratios for different voltage level lines
- AC transmission line models encompassing:
  - types of transmission line models based on line length
  - calculation of voltage drop, line regulation and transmission efficiency
  - load sharing between lines
- basic design features and characteristics of poles/structures and associated equipment and/or components encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing of poles/structures and associated equipment and or components
  - distribution systems principles:
    - terminologies
    - primary and secondary
    - voltage levels
    - supply quality
    - load curve profiles (residential/industrial/commercial)
    - types of feeders
    - urban and rural single-phase systems
    - SWER
  - characteristics of poles:
    - types of poles (wood, concrete and steel)
    - installation methods of poles (tooling, rake, life, labelling and sinking)
    - maintenance techniques of poles (above and below ground pole strength and loads)
  - characteristics of associated equipment used on poles and structures:
    - cross-arms (types and standard sizes)

    - insulators
- basic design features and characteristics of underground cables, lines, poles/structures and associated equipment and/or components encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
    - overhead lines characteristics:
        - type of components
        - characteristics of conductor material
        - mechanical limitations and physical dimensions of lines
        - current rating factors (heating, voltage drops, power losses) of conductors
        - aerial bundled cables (HV and LV)
        - covered conductors
    - characteristics and constructional features of poles and structures:
        - types of poles and structures
        - characteristics of poles/structure materials
        - mechanical limitations of poles/structures
        - footings and additional support techniques
    - characteristics and constructional features of underground cables:
        - underground cables constructional features
        - insulation materials and abbreviations
        - cable dielectrics, electric stress and cable voltage drop
    - calculation of cable voltage drop in relation to length of cable run
    - techniques in reducing electrical stress on cables
    - cable rating factors
    - methods of joining and terminating cables
    - techniques in the installation of cables above and below ground
    - techniques in cable testing and the location of cable faults
    - techniques in cable drawing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS003 Design power system distribution substations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the technical design of distribution substations to relevant standards and specifications, including earthing, location of substation relevant to load, customer and environmental needs and minor civil aspects. It also includes the necessary established procedures to ensure the substation design conforms to specific organisational technical standards, operational and system planning requirements and encompasses the principles of safe design.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Pathway Unit Group 1

UETDRDS013 Organise and implement ESI line and easement surveys

UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure

Pathway Unit Group 2

UETDRDS006 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for and coordinate the safe design of distribution substations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of distribution substations, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures

	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the design of distribution substations	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance

		with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of distribution substations	**3.1**	Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS37 Design power system distribution

substations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS003 Design power system distribution substations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing six (6) technical designs of a distribution substation relating to at least two of the following project types:
  - multi-transformer substations
  - residential developments
  - industrial/commercial developments
  - alteration to existing assets
- completing designs, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist, which lists all of the required design activities to be carried out in this process
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- mathematics techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
  - identification of basic concepts, principles and applications:
    - application of velocity, acceleration, force, density, torque and pressure

- applications of the International System of Units (SI) units
- the relationship between work, power and energy
- behaviour of object under force:
  - using a block and tackle under load
  - concept of mechanical advantage
  - determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- fundamentals of the basic laws of fluid mechanics

- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications:
    - properties of tensile strength
    - effects of temperature on the expansion of metals
    - ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers
- generation systems encompassing:
  - methods of generating electricity:
    - types of power stations and reasons for their location
    - layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements:
    - operating speeds for thermal and hydroelectric generating sets
    - typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- substations and power transformers encompassing:
  - relationship between the substations within an overall power system:
    - purpose and location in relation to load centres
    - layout of high voltage (HV) equipment within the substation and auxiliary equipment
  - characteristics of a power transformer:
    - basic construction of distribution transformers
    - operation under load/no load conditions
    - types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers:
    - function and basic operation
  - maintenance of a power transformer:
    - basic connections
    - restrictions to parallel operation
    - problems and remedies associated with harmonics
    - testing and fault-finding procedures
  - characteristics of a power transformer:

        - description and purpose
- the installation of metering and control equipment encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
    - types of meters:
        - kilowatt-hour meters single and polyphase
        - demand meters
        - recording meters and electronic recording metering systems summators
    - installation and removal methods:
        - direct connection and plug in method
        - enterprise specific
    - types of associated equipment and accessories:
        - meter boards, service fuse, links, contactors, time switch and audio frequency injection relay
    - testing procedures:
        - safety and polarity testing
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV systems
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- the installation of switchgear and associated equipment encompassing:
    - types and function of various switchgear:
        - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches and circuit breakers
        - operating characteristics
        - advantages and disadvantages of different types of switchgear
        - installation procedures
        - earthing requirements and techniques
    - types of equipment, including:
        - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
    - installation procedures for switchgear and equipment encompassing:
        - standards, codes, legislation, supply authority regulations and/or enterprise requirements
        - assembly and erecting procedures
        - earthing requirements and techniques and pole mounted locations
    - maintenance procedures for switchgear and equipment:
        - diagnosing and rectifying faults according to electricity supply industry (ESI) standards and procedures

    - testing and commissioning:
        - ESI standards and procedures
- HV distribution transformer principles encompassing:
    - operation of HV distribution transformers:
        - principle governing factors for transformer ratings, protection and alarms
        - operating limitations and the relationship between transformer and HV fuse rating
        - purpose and principle operation of HV distribution transformer tap changers
        - HV distribution transformer and transformer - cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults
    - HV underground switching equipment:
        - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers
- feeder automation system encompassing:
    - function of feeder automation system and the main components
    - operation procedure for a remote field device from a local control station
    - functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
    - SCADA system security interlocks and access restrictions
    - SCADA system operation when switching apparatus or retrieving data via a remote access device, such as remote access terminal (RAT), dial up voice annunciated system and local control station
    - function of the main components of a local/remote control system
    - operation of a field devices using SCADA systems via a RAT, dial up annunciated system and local control station
- environmental fundamentals encompassing:
    - environmental standards, codes, environmental legislation, supply authority regulations and/or enterprise requirements applicable to the control of environment associated with the worksite encompassing, relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi government policies and regulations and relevant community planning and development agreements (land care agreements)
    - employer and employee responsibilities
    - methods of obtaining information on environmental issues and updates
    - methods of identifying environmental impacts from work related activities
    - meaning of environmental terms encompassing:
        - identification, assessment and control of risks
        - compliance and best practice and sustainable energy
    - procedures in implementing management plans to ensure compliance
- layout principles for a distribution substation minor upgrade encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to a distribution substation

minor upgrade
    - requirements for the use of distribution substation minor upgrade construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
    - methods in determining material, equipment and tool lists:
        - components types and quantity required
        - spacing of components and equipment
        - costings of items and components
    - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
    - determination of conductor size, type and route length
    - resources needed for the laying of conductors, cables and equipment
    - determining the appropriate installation sequence
    - minimum clearances between conductors and equipment
    - estimation of the duration of underground distribution extension project
- fundamentals of distribution transformers encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the safe operation and testing of distribution transformers and auxiliary equipment
    - drawing layouts, conventions and symbols:
        - vector group of transformers
        - three phase transformers
    - construction of a distribution transformer
    - characteristics when operated under load and no-load conditions
    - percentage impedance determinations by test and calculation
    - function and operation of tap charging switches, including solid state tap changing equipment
    - function and operation of transformer auxiliary equipment
    - problems caused by harmonics in transformers
    - methods and equipment used to overcome harmonics in transformers
- testing procedures of distribution transformers encompassing:
    - safety precautions specific to the testing of distribution transformers
    - procedures for safely connecting distribution transformers for testing
    - testing of distribution transformers to determine losses
    - calculation of transformer's efficiency
    - methods and types of equipment used to cool transformers:
        - properties of transformer oil and tests performed on transformer oil
    - techniques in performing selected tests on transformer oil
    - techniques in performing testing procedures on armer
    - techniques in testing distribution transformers
    - distribution transformer parallel connections:

    - conditions and restrictions for parallel operations
  - calculations of loading on transformers operating in parallel
  - connection of transformer in parallel to supply a common load
- distribution earthing system encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to the distribution earthing system
  - reason and types of distribution earthing systems
  - terminologies used in the earth systems including, touch and step potential
  - conditions associated when an active HV conductor fails to earth
  - selection of earthing electrodes and grids
  - determination of the earthing resistance of copper clad rods using earthing monograms.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS004 Design power system public lighting systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the technical design of public lighting systems. This includes pedestrian and traffic route lighting to relevant Australian Standards utilising appropriate software to generate design conformance.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies,

procedures and programs

Pathway Unit Group 1

UETDRDS013 Organise and implement ESI line and easement surveys

UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure

Pathway Unit Group 2

UETDRDS006 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for and coordinate the safe design of public lighting systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures which may influence the design of public lighting systems are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a

		quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including equipment, tools and PPE required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
2 Carry out and coordinate the design of public lighting systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate

		authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of public lighting systems	**3.1**	Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS38 Design power system public lighting systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS004 Design power system public lighting systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing six (6) technical designs of a public lighting system utilising at least three (3) of the following project types:
  - single light on existing assets
  - main road/minor road schemes
  - intersections
  - traffic management devices
  - alteration to existing assets
  - multi-circuit systems
- completing designs, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- mathematics techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:

- identification of basic concepts, principles and applications:
  - application of velocity, acceleration, force, density, torque and pressure
- applications of the International System of Units (SI) units
- the relationship between work, power and energy
- behaviour of object under force:
  - using a block and tackle under load
  - concept of mechanical advantage
  - determination of resultant forces
  - determining the sag in a catenary conductor and the force applied at each end
- fundamentals of the basic laws of fluid mechanics

- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications:
    - properties of tensile strength
    - effects of temperature on the expansion of metals
    - ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system:
    - different organisations responsible for generation, transmission, distribution and rail/tram and how they correlate and their functions
  - characteristics of a transmission, distribution and rail system:
    - principal components
    - typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system:
    - advantages/disadvantages
    - applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts:
    - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- procedures for installation and maintenance on public lighting structures and associated equipment encompassing:
  - standards, codes, legislation, supply authority regulations, local government and/or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment
  - safety precautions specific to working on street lighting:

- safe working practices and procedures
- safe clearances from low voltage (LV) and HV mains
- working at heights, working in confined spaces, permit to work systems and isolation procedures
- emergency response and rescue, including first aid

- basic public lighting principles:
  - electromagnetic spectrum
  - principles of colour
  - behaviour of light
  - factors that affect illumination
- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
  - street lighting circuits and earthing system
- types of tools and equipment used for installation and maintenance
- types and function of lanterns/luminaires/lamps, control equipment, poles and associated hardware used for street lighting:
  - high-pressure mercury vapour, low pressure and high-pressure sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches and contactor boxes
- types of lighting systems:
  - overhead and underground street lighting systems and controlling and switching of lighting systems
- techniques for the installation of street lighting systems
- techniques for the maintenance of street lighting systems:
  - diagnosing of faults
  - removing, repairing, replacing and cleaning of public lighting and associated hardware
- application of specific testing equipment:
  - voltage detectors
  - insulation resistance testers
  - clamp-on ammeters
  - continuity testers
  - fault indictors
- techniques for the inspection, testing and commissioning of street lighting systems

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV systems
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- principles of light design layout encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply

authority regulations and/or enterprise requirements applicable to the light design principles
- requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
- types of tariffs and charges
- types of street lighting components:
  - column types, foundations, brackets, luminaries and mounting heights
- types of electrical street lighting circuits:
  - types of supply
  - lighting circuit and control circuit
- fundamentals of lighting production:
  - electromagnetic spectrum
  - visible and non-visible radiation
  - spectral energy distribution
  - infra-red, ultraviolet, radiation-safety, incandescence and phosphorescence
  - reflection and refraction
- fundamentals of lighting concepts:
  - terms and units and the purpose of reflectors and diffusers
- factors affecting external lighting design
- calculation of light output
- determining illuminance:
  - point to point and lumen method
- determining rated life of luminaries
- fundamentals of street lighting design
- considerations for special lighting situations:
  - security lighting, hazardous street locations and emergency lighting

- principles to layout and draft a street lighting system encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to street lighting system layouts and drafts
  - requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components, such as equipment, poles and cross-arms
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length

- determination of street lighting positions for optimum visibility and to minimise traffic hazards
- techniques in mounting and positioning of lights
- resources needed for the installation of street lighting system
- methods of pegging out of pole positions and/or underground cable positions
- minimum clearances between overhead conductors and LV and HV structures
- estimation of the duration of overhead distribution extension project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS005 Design underground distribution power systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the technical design of underground distribution and sub-transmission networks to relevant standards, including cable sizing and locations, soil resistivity and heat dissipation, backfill and trenching details, minor civil aspects and dynamic and cyclic ratings. It also includes the necessary established procedures to ensure the line design conforms to specific organisational technical standards, operational and system planning requirements and encompasses the principles of safe design.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Pathway Unit Group 1

UETDRDS013 Organise and implement ESI line and easement surveys

UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure

Pathway Unit Group 2

UETDRDS006 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for and coordinate the safe design of underground distribution systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of underground distribution systems, are reviewed and determined
	1.2 Purpose of the design is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures or policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures

	1.5	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the design of underground distribution systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models for the design of the underground distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance

		with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of underground distribution systems	**3.1**	Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS36 Design underground distribution power systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS005 Design underground distribution power systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing six (6) technical designs of an underground distribution or sub-transmission network relating to the following project types:
  - residential subdivision developments
  - industrial/commercial subdivision developments
  - alteration to existing assets
  - underground supplies to single customers, including projects requiring substations
- completing designs, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- dealing with unplanned events on at least one occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- mathematics techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
  - identification of basic concepts, principles and applications:
    - application of velocity, acceleration, force, density, torque and pressure

- applications of the International System of Units (SI) units
- the relationship between work, power and energy
- behaviour of object under force:
  - using a block and tackle under load
  - concept of mechanical advantage
  - determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- fundamentals of the basic laws of fluid mechanics

- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications:
    - properties of tensile strength
    - effects of temperature on the expansion of metals
    - ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers
- installation of underground cable encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safety precautions specific to the installation of underground cable:
    - excavation and trench safety regulations
    - gas detection procedures
    - working in confined spaces
    - personal protective equipment (PPE)
    - hazards for the use of liquid petroleum gas (LPG) equipment for jointing of underground cable
    - gas bottle testing procedures
    - permit to work systems and isolation procedures
  - trench excavation and reinstatement procedures
  - installation of underground cable procedures:
    - types of tools and equipment
    - methods of installing conduits
    - methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
  - procedures for the safe use of LPG equipment for cable jointing
- construction and types of underground cables encompassing:
  - safety precautions specific to handling underground cables
  - requirements for the use of enterprise manuals, system diagrams/plans and drawings
  - types and applications of underground cables
  - construction types and structures of underground cables
  - characteristics of different types of underground cables

- ratings
- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV) systems
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- the implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment encompassing:
  - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission:
    - Commonwealth/state/territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
  - identification, assessment, control and monitoring of the hazards to the environment associated with the powerline industry
  - workplace environment quality standards enterprise plan:
    - setting of acceptable emission level limits from power plant equipment
    - impact of the enterprise activities on air and water quality
    - nature, impact and level of emissions from power plant, power distribution and transmission equipment and network infrastructure (noise generation, noxious gas emissions, greenhouse gas production, electromagnetic emissions, electromagnetic field strength, oil leakage and insulation breakdown products)
  - provision of manufacturer and supplier information, such as material safety data sheets (MSDS)
  - gathering of environment management information
  - maintenance of environmental records
  - risk assessment and its management in powerline industry
  - maintenance strategies for environment protection programs:
    - developing processes for promoting, maintaining and improving environmental impact in the workplace
    - identifying techniques for evaluating and reviewing environment protection education and training programs and elements of an effective environment protection management system
    - Environment Protection Authority (EPA) consultation and accident/incident investigations
- layout principles for underground mains distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to underground mains distribution extension
  - requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the

control of WHS/OHS risks
    - methods in determining material, equipment and tool lists:
        - components types and quantity required
        - spacing of components and equipment
        - costings of items and components
    - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
    - determination of conductor size, type and route length
    - resources needed for the laying of conductors
    - determining the appropriate excavation for the location
    - determining the size and depth of excavation
    - determining the trench and pit layout procedures
    - minimum clearances between conductors
    - estimation of the duration of underground distribution extension project
- system components and layouts encompassing:
    - distribution system layouts:
        - overhead/underground and/or urban/rural
        - HV customers
        - high-rise building systems
        - three phase lines
        - single phase lines
        - single wire earth return (SWER) systems
        - spur, parallel and ring systems
        - typical substation types
    - transmission system layouts:
        - lines, buses, transformers and cables
        - line/bus layouts, including single, double, ring and breaker and half systems
        - HV crossing methods
- basic design features and characteristics of underground cables, lines, poles/structures and associated equipment and/or components encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
    - overhead lines characteristics:
        - type of components
        - characteristics of conductor material
        - mechanical limitations and physical dimensions of lines
        - current rating factors (heating, voltage drops and power losses) of conductors
        - aerial bundled cables (HV and low voltage (LV))
        - covered conductors
    - characteristics and constructional features of poles and structures:

    - types of poles and structures
    - characteristics of poles/structure materials
    - mechanical limitations of poles/structures, footings and additional support techniques
- characteristics and constructional features of underground cables:
    - underground cables constructional features
    - insulation materials and abbreviations
    - cable dielectrics, electric stress and cable voltage drop
- calculation of cable voltage drop in relation to length of cable run
- techniques in reducing electrical stress on cables
- cable rating factors
- methods of joining and terminating cables
- techniques in the installation of cables above and below ground
- techniques in cable testing and the location of cable faults
- techniques in cable drawing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS006 Develop high voltage and low voltage distribution protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the development of appropriate protection systems for high voltage (HV) and low voltage (LV) distribution networks, including calculations of fault levels, selection of appropriate protection devices and automation requirements, and protection coordination schemes. It also includes recommendations to support the calculations and must ensure conformance to specific organisational operational and system planning requirements, and compliance with national or supply authority codes.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan and coordinate for the development of HV and LV protection systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the development of HV and LV protection systems, are reviewed and determined
	1.2 Purpose of the development is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the development are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or

		established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the development of HV and LV protection systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the HV and LV protection systems are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance

		specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the development of HV and LV protection systems	**3.1**	Final inspections of the system design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS43 Develop high voltage and low voltage distribution protection systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS006 Develop high voltage and low voltage distribution protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing at least two (2) designs from two (2) of the following project types:
  - distribution overhead designs
  - distribution underground designs
  - distribution substation designs
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS systems
  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assess resources to establish and maintain WHS/OHS management systems
- principles of safe design encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles

- particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- application of safe design principles:
  - safe design duty related information, safe design process related information and safe design evaluations

- installation of switchgear and associated equipment encompassing:
  - types and function of various switchgear:
    - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches and circuit breakers
    - operating characteristics
    - advantages and disadvantages of different types of switchgear
    - installation procedures
    - earthing requirements and techniques
  - types of equipment:
    - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
  - installation procedures for switchgear and equipment:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements
    - assembly and erecting procedures
    - earthing requirements and techniques and pole mounted locations
  - maintenance procedures for switchgear and equipment:
    - diagnosing and rectifying faults according to electricity supply industry (ESI) standards and procedures
  - testing and commissioning:
    - ESI standards and procedures
- electrical equipment associated with distribution field device protection and control schemes encompassing:
  - types and applications of electrical equipment:
  - characteristics and capabilities
  - schemes, automatic circuit reclosers (ACRs), gas switches, secondary injection tests, primary injection tests, TMR radios, supervisory control and data acquisition (SCADA), remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, direct current (DC) supplies, alternating current (AC) supplies and alarms
- calculation of fault levels encompassing:
  - calculation of fault levels in symmetrical and asymmetrical fault conditions:
    - types of faults
    - interconnected and radial systems
    - symmetrical components
    - representation of voltages and currents

        - sequence impedances of system plant
        - calculation/determination of sequence impedance networks
        - determination of operative sequence impedances
        - fault or arc impedances
        - first approximation techniques
    - interrupting device capabilities:
        - determination of fault current breaking capability and let through energy capability of fuses and circuit breakers
        - DC offset and transient condition effects
- detailed operation and setting of discrete protection systems encompassing:
    - earth fault protection:
        - master earth leakage schemes
        - sensitive earth fault relays and schemes
        - residual earth fault scheme
        - core balance earth fault scheme
        - frame/structure earth leakage scheme
        - time graded discrimination
        - backup protection
    - overcurrent protection:
        - feeder overcurrent protection
        - instantaneous overcurrent schemes
        - inverse timed overcurrent schemes
        - types and location of components of an overcurrent scheme
        - CT summation
        - time graded discrimination
        - backup protection
    - alarms and controls:
        - auxiliary relays
        - voltage regulating relays
        - line drop compensation
        - gas relay types
        - gas relay scheme operation and setting
        - over temperature schemes
- polyphase systems and its application towards the calculation of circuit conditions encompassing:
    - structure of a three phase system:
        - components, sequence of phases and balanced and unbalanced load conditions
    - calculations of phase and line voltages for a specified phase sequence
    - calculation of voltage, current, power, power factor in a three phase system:
        - balanced three phase systems

- unbalanced delta connected loads
- unbalanced four-wire star connected loads
- unbalanced three-wire star connected loads
- unbalanced four-wire star connected systems
- calculation of the neutral displacement voltage in unbalanced three-wire star connected systems
- selection and connection of meters to confirm calculations
- control of harmonics:
  - harmonic analysis of non-sinusoidal waves of voltage and current
  - production of harmonics in three phase power systems
  - effects of harmonics on three power systems and loads
  - types of harmonics commonly encountered on three phase power systems
  - identification by observation of harmonic components present in a waveform
- calculation of effective value of non-sinusoidal waves
- calculation of current/voltage in a complex load given a voltage/current with a Fourier analysis of up to 3 terms
- pre-unit system in calculations:
  - reasons for use
  - groups of parameters commonly represented
  - common applications of the per-unit system to represent device specifications
  - applications of per-unit quantities in simple electrical calculations
- method of symmetrical components:
  - reasons for the use
  - types of components used to represent a three phase system
  - reasons for difference in the impedance of a component to the various symmetrical components and commonly occurring relationships between different sequence impedances for common component groups
- protection schemes encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
  - types of protection schemes:
    - reasons for use
    - application of protection zones around system elements and degree of protection
  - types of feeder protection equipment:
    - overcurrent protection inverse time-current operating characteristics
  - operation of overcurrent protection equipment used on distribution systems
  - operation of ACRs and their time-current characteristics
  - types and characteristics of overcurrent relays
  - coordination methods of a distribution feeder protection scheme
  - earth fault protection used on a distribution feeder

- operation of a single wire earth return (SWER) system.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for high voltage (HV) and low voltage (LV) distribution protection systems
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS007 Develop planned power systems outage strategies

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the competency required to assess and manage the impact on the network and customers with regards to planned outages. This includes customer outage times, network and plant loading issues and regulatory requirements. A detailed knowledge of network performance indicators is required.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for and coordinate the development of outage strategies	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the outage strategies, are reviewed and determined
	1.2 Purpose of the outage is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the outage are obtained or established with appropriate personnel
	1.4 Equipment/tools and personnel protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures

2 Carry out and coordinate the development of outage strategies	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the strategy in accordance with requirements and/or established procedures
	2.3	Strategy decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the outage strategies are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the strategy within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the development of outage strategies	**3.1**	Final review of the strategy is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of outage strategy documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS46 Develop planned power systems outage strategies.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS007 Develop planned power systems outage strategies

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- writing three (3) outage strategies, including at least one (1) of each of the following network types:
  - low voltage (LV) networks
  - high voltage (HV) networks
- each of the above outage strategies must include the following:
  - switching instructions laid out according to enterprise requirements
  - a documented process to indicate methods used to check switching instructions
  - documentation of coordination process of switching schedules
  - documentation of plant loading calculation
  - initiation of customer notifications according to enterprise requirements
  - entry of data for collection of 'minute of supply' records into relevant systems
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage (ELV), LV and HV hazards and high current hazards encompassing:
  - risk management and assessment of risk:
    - principle and purpose of risk management and processes for conducting a risk assessment
  - hazards associated with LV, ELV and high currents

- arrangement of power distribution and circuits in an electrical installation
- parts of an electrical system and equipment that operate at LV and ELV
- parts of an electrical system and equipment where high currents are likely
- risks and control measures associated with HV:
  - parts of an electrical system and equipment that operate at HV
  - the terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of HV
  - control measures used for dealing with the hazards of HV
- optical fibre safety:
  - coherent optical sources and joining procedures and laser safety class 3a devices or their replacement
- risks and control measures associated with LV:
  - risks associated with modifying electrical installations, fault finding, maintenance and repair
  - control measures before, during and after working on electrical installations, circuits or equipment
  - isolation and tagging-off procedures
  - risks and restrictions in live work and control measures for live work
- risks and control measures associated with harmful dusts and airborne contaminants:
  - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials
- safety, selection, use, maintenance and care of test equipment:
  - safety characteristics of electrical testing devices
  - safe use of electrical testing device
  - checks and storage methods for maintaining the safety of testing devices
- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management systems
  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assess resources to establish and maintain WHS/OHS management systems
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination:
    - clear and concise instructions and information

    - methods for the encouragement of feedback and contributions of information and ideas
    - responsibilities of members of the team
  - techniques in analysing, planning, coordination and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites:
    - electrical network diagrams for the specific worksite
    - earth access authorities
    - safe working area
    - work to be carried out in confined space or in hazardous environment
    - specific outsourcing procedures
    - specific hazard identification, risk classification and management procedures
    - regulatory requirements, such as WHS/OHS and electrical safety
  - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits:
    - working in confined space, if required
    - coordination of access authorities
    - engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- principles of safe design encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
  - application of safe design principles:
    - safe design duty related information, safe design process related information and safe design evaluations
- installation of switchgear and associated equipment encompassing:
  - types and function of various switchgear:
    - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches and circuit breakers
    - operating characteristics
    - advantages and disadvantages of different types of switchgear
    - installation procedures

        - earthing requirements and techniques
    - types of equipment:
        - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
    - installation procedures for switchgear and equipment:
        - standards, codes, legislation, supply authority regulations and/or enterprise requirements
        - assembly and erecting procedures
        - earthing requirements and techniques and pole mounted locations
    - maintenance procedures for switchgear and equipment:
        - diagnosing and rectifying faults according to electricity supply industry (ESI) standards and procedures
    - testing and commissioning:
        - ESI standards and procedures
- LV switching principles encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
    - requirements for the use of manuals, system diagrams/plans and drawings:
        - types, characteristics and capabilities of electrical apparatus
        - use, characteristics and capabilities of specialised tools and testing equipment
        - LV network interconnectors source of possible back-feed
    - LV switching techniques:
        - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures and personnel protective equipment (PPE) for LV switching
- HV switching principles encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
    - requirements for the use of manuals, system diagrams/plans and drawings:
        - types, characteristics and capabilities of electrical apparatus
        - use, characteristics and capabilities of specialised tools and testing equipment
        - HV network interconnectors source of possible back-feed
    - role of the HV switching operator
    - operational forms, access authorities and permits associated with HV switching:
        - types of operational forms, access authorities and permits
        - purpose and procedure for operational forms, access authorities and permits
    - use and operation of equipment associated with HV overhead and substation equipment:
        - test instruments, sticks, interrupters and arc stranglers
    - types and categories of HV switchgear
    - application, function and operating capabilities of switchgear
    - restrictions pertaining to HV switching equipment

- procedures for the isolation of HV transmission main and working earths
- earthing HV electrical apparatus practices and procedures for access:
  - purposes of operational and additional work part 'on-site' earths
  - factors determining the location and effectiveness of operational earthing
  - acceptable industry procedures and PPE
- HV switching techniques
- operating switching apparatus:
  - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

- HV overhead and substation switching principles encompassing:
  - legislation, standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to HV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings:
    - types, characteristics and capabilities of HV electrical equipment to be switched
    - use and characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the HV switching operator
  - operational forms, access authorities and permits hazard/risk assessments associated with HV switching:
    - types of operational forms, access authorities and permits
    - hazard/risk assessments and purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with HV overhead and substation equipment:
    - test instruments, sticks, interrupters and arc stranglers
  - HV switchgear:
    - types, categories, application and operating capabilities
  - operation of HV overhead switching or indicating devices:
    - fuses; disconnect fuses
    - load switching
    - live line indicators
    - capacitors
    - reclosers
    - sectionalisers
    - underslung links
    - air-breaks
    - switches
    - disconnects
    - live line clamps
    - phasing sticks
    - phasing tester

- operation of protection systems and substation equipment:
  - fault levels and settings
  - types and applications
  - protection systems and substation equipment fault levels and settings
  - types and applications
- restrictions pertaining to HV switching equipment
- procedures for the isolation of HV mains and working earths:
  - earthing HV electrical apparatus practices and procedures for access authority issuing
  - HV switching techniques
- operate switching apparatus:
  - identifying hazards, assessing and controlling risks associated with HV switchgear operation
  - systematic and defensive techniques
  - mobile radio procedures
  - double isolation procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry to develop planned outage strategies
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS008 Draft and layout a power system distribution substation minor upgrade

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the drafting and laying out of minor low voltage (LV) distribution substation upgrades, including the estimating of the costs and/or resources for the work to be undertaken. It also encompasses on-the-job design, surveying techniques, the pegging and/or marking out of the trench position, the pit/pillar position and the cable position according to the work order and enterprise requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to draft and layout a distribution substation upgrade	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures are prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and in accordance with established procedures
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the

		job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out the drafting and layout of a distribution substation upgrade	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Drafting and layout of a distribution substation upgrade is carried out in accordance with the work schedule and

		requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe drafting and layout of a distribution substation upgrade to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the drafting and layout of a distribution substation upgrade	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies are reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and substation equipment, apparatus, wiring and instrumentation are returned to service and advised to client/customer in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS34 Draft and layout a power system distribution substation minor upgrade.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS008 Draft and layout a power system distribution substation minor upgrade

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- drafting at least one (1) of the following:
  - a multi-phase pole mounted distribution transformer upgrade plan/layout
  - a single-phase pole mounted transformer upgrade plan/layout
- laying out at least one (1) of the following:
  - a multi-phase underground distribution substation upgrade
  - a multi-phase distribution substation or associated equipment upgrade, e.g., substations, transformers, high voltage (HV)/low voltage (LV) switchgear
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
    - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors:
    - types of LV and HV overhead electrical conductor connections
    - causes and effects of poor electrical connections

        - reasons for and methods used to maintain standard phase sequencing
        - removing, repairing and replacing of damage conductors
        - minimum clearances between overhead conductors and LV and HV structures
    - techniques for conductor installation:
        - types and application of tools, equipment and hardware
        - methods of stringing, tensioning and termination of LV and HV conductors
- installation of underground cable encompassing:
    - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
    - safety precautions specific to the installation of underground cable:
        - excavation and trench safety regulations
        - gas detection procedures
        - working in confined spaces
        - personal protective equipment (PPE)
        - hazards for the use of liquid petroleum gas (LPG) equipment for jointing of underground cable
        - gas bottle testing procedures
        - permit to work systems and isolation procedures
    - trench excavation and reinstatement procedures
    - installation of underground cable procedures:
        - types of tools and equipment
        - methods of installing conduits
        - methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
    - procedures for the safe use of LPG equipment for cable jointing
- construction and types of underground cables encompassing:
    - safety precautions specific to handling underground cables
    - requirements for the use of enterprise manuals, system diagrams/plans and drawings
    - types and applications of underground cables
    - construction types and structures of underground cables
    - characteristics of different types of underground cables
    - ratings
- enterprise-specific switching diagrams and drawing encompassing:
    - types and application of enterprise-specific switching drawings and documents:
        - wiring and schematic diagrams and switching symbols
        - mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams:
        - LV system switching diagrams
        - direct current (d.c.) traction supply sectioning diagrams

    - HV transmission and distribution system symbols and feeder plans
    - processes of updating switching diagrams
- power distribution network documentation encompassing:
    - requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
    - types and application of power distribution network documentation drawings and documents:
        - wiring and schematic diagrams, drawings and switching symbols
        - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different diagrams and documentation on LV and HV systems:
        - overhead distribution extensions
        - underground distribution extensions
        - distribution substations
        - street lighting systems
- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the surveying for an overhead and underground extension
    - techniques in measuring heights and distances
    - techniques in taking bearings/angles of deviation using a compass
    - techniques in using a clinometer
    - techniques in recording and storage of data
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
    - techniques in plotting long spans:
        - measuring stick, clinometer, trundle wheel and tapes
        - correction for sloping ground
        - distance across objects and range rods
    - techniques in pegging pole positions:
        - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs
- fundamentals of computer-aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
    - types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and/or upgrade
    - techniques in storing and retrieving programs and files from the computer
    - identification and methods of retrieving and manipulating digital symbols, designs, layouts, fonts and graphs stored in the computer

- techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer, such as:
  - using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
- calculation of dimensions and drafting measurements using the computer
- techniques in the preparation of preliminary sketches using the computer
- techniques in using 2-D computer graphics system and associated equipment to produce a distribution extension and or upgrade draft or layout
- techniques to diagnosing basic faults in computer operation

- layout principles for underground mains distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to underground mains distribution extension
  - requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components and equipment
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - resources needed for the laying of conductors
  - determining the appropriate excavation for the location
  - determining the size and depth of excavation
  - determining the trench and pit layout procedures
  - minimum clearances between conductors
  - estimation of the duration of underground distribution extension project
- layout principles for a distribution substation minor upgrade encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to a distribution substation minor upgrade
  - requirements for the use of distribution substation minor upgrade construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components and equipment
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information

- determination of conductor size, type and route length
- resources needed for the laying of conductors, cables and equipment
- determining the appropriate installation sequence
- minimum clearances between conductors and equipment
- estimation of the duration of underground distribution extension project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry to undertake drafting and layout of a distribution substation upgrade
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS009 Draft and layout a power system overhead distribution extension

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the planning and layout of one or two pole minor overhead distribution extensions, including estimating of the costs and/or resources for the work to be undertaken. It also encompasses on-the-job design, surveying techniques and layout to the field locations in accordance with enterprise requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to draft and layout an overhead distribution extension	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, work health and safety (WHS/occupational health and safety (OHS) risks are assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the

		job are identified, scheduled and coordinated, and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out drafting and layout of an overhead distribution extension	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised person/s for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	The drafting and layout of an overhead distribution extension is carried out in accordance with the work

		schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied for the drafting and layout of an overhead distribution extension to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete drafting and layout of an overhead distribution extension	**3.1**	Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and the job is returned to service and advised to client/customer in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS31 Draft and layout a power system overhead distribution extension.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS009 Draft and layout a power system overhead distribution extension

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- drafting at least one (1) of the following:
  - a low voltage (LV) single phase distribution extension plan/layout
  - an LV multi-phase distribution extension plan/layout
- laying out at least one (1) of the following:
  - a high voltage (HV) single phase distribution extension
  - a HV multi-phase distribution extension
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
    - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors:
    - types of LV and HV overhead electrical conductor connections
    - causes and effects of poor electrical connections
    - reasons for and methods used to maintain standard phase sequencing

        - removing, repairing and replacing of damage conductors
        - minimum clearances between overhead conductors and LV and HV structures
    - techniques for conductor installation:
        - types and application of tools, equipment and hardware
        - methods of stringing, tensioning and termination of LV and HV conductors
- installation of poles and or structures and hardware encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
    - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
        - characteristics and applications of different types of poles and associated hardware
    - techniques for installing poles and associated hardware:
        - types of installation equipment/tools
        - excavation methods
        - types of footings/foundations
        - types of attachments, earthing systems, clearances between conductors, safe methods of erecting and stabling poles and/or structures and cross-arms
    - techniques for maintenance of poles and associated hardware:
        - stabilisation techniques for unstable poles
        - methods of strengthen poles
        - maintenance and replacement of HV insulators and cross-arms
- different types and function of distribution components encompassing:
    - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
    - types, function and characteristics of distribution components
    - safety policies, procedures and precautions related to the handling and installing of distribution components
- enterprise-specific switching diagrams and drawing encompassing:
    - types and application of enterprise-specific switching drawings and documents:
        - wiring and schematic diagrams and switching symbols
    - mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams:
        - LV system switching diagrams
        - direct current (d.c.) traction supply sectioning diagrams
        - HV transmission and distribution system symbols and feeder plans
        - processes of updating switching diagrams
- power distribution network documentation encompassing:

- requirements for the use of manuals, system diagrams/plans and drawings, and for plans such as work method statements for the control of WHS/OHS risks
- types and application of power distribution network documentation drawings and documents:
  - wiring and schematic diagrams
  - drawings and switching symbols
  - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
- interpretation of different diagrams and documentation on LV and HV systems:
  - overhead distribution extensions
  - underground distribution extensions
  - distribution substations
  - street lighting systems

- layout principles for overhead distribution encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to overhead distribution layout
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings, and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components, such as equipment, poles and cross-arms
    - costings of items and components
  - purchasing and contractual arrangements including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length -
  - resources needed for the stringing and maintenance of conductors
  - types of low LV and HV overhead electrical conductor connections
  - minimum clearances between overhead conductors and LV and HV structures
  - estimation of the duration of overhead distribution extension project
- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the surveying for an overhead and underground extension
  - techniques in measuring heights and distances
  - techniques in taking bearings/angles of deviation using a compass
  - techniques in using a clinometer
  - techniques in recording and storage of data
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings

- techniques in plotting long spans:
  - measuring stick, clinometer, trundle wheel and tapes
  - correction for sloping ground
  - distance across objects and range rods
- techniques in pegging pole positions:
  - foot path alignments
  - types of pegs, pegs of other authorities and locating survey pegs
- fundamentals of computer-aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:
  - Commonwealth, sate/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
  - types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and or upgrade
  - techniques in storing and retrieving programs and files from the computer
  - identification and methods of retrieving and manipulating digital symbols, designs, layouts, fonts and graphs stored in the computer
  - techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer, such as:
    - using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
  - calculation of dimensions and drafting measurements using the computer
  - techniques in the preparation of preliminary sketches using the computer
  - techniques in using 2-D computer graphics system and associated equipment to produce a distribution extension and/or upgrade draft or layout
  - techniques to diagnosing basic faults in computer operation
  - requirements for aerial linework:
    - planning, establishing and implementing relevant aviation authority clearances
    - determining system requirements
    - aircrew familiarisation with network operations and equipment
    - requirements for effective communications operations for aerial work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic

and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry to draft and layout an overhead distribution extension
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS010 Draft and layout a power system street lighting system

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the planning and layout of street lighting systems. It includes the conduction of site inspections to confirm and/or modify a street lighting system layout, estimation of costs and resources for the work order, and the pegging out of the poles/underground cables according to the work order and to optimise visibility and minimise traffic hazards. It also encompasses the provision of advice on conditions of supply and permits and the communication and coordination needed to be undertaken with the relevant authorities and clients.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to draft and layout a street lighting system	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks are assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and in accordance with established procedures
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the

		job are identified, scheduled and coordinated and confirmed as safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out the drafting and layout of a street lighting system	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	The drafting and layout of a street lighting system are carried out in accordance with the work schedule and

		requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe drafting and layout of a street lighting system to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
3 Complete the drafting and layout of a street lighting system	**3.1**	Work undertaken is checked against works schedule for conformance with requirements, anomalies are reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and are returned to service and advised to client/customer in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS33 Draft and layout a power system street lighting system.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS010 Draft and layout a power system street lighting system

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- producing all of the following:
  - preliminary plan for a street lighting system
  - a layout of a street lighting system
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
    - material lists, conductor size, type and route length
  - construction types and structures for distribution and sub-transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors:
    - types of low voltage (LV) and high voltage (HV) overhead electrical conductor connections
    - causes and effects of poor electrical connections
    - reasons for and methods used to maintain standard phase sequencing
    - removing, repairing and replacing of damaged conductors
    - minimum clearances between overhead conductors and LV and HV structures

- techniques for conductor installation:
  - types and application of tools, equipment and hardware
  - methods of stringing, tensioning and termination of LV and HV conductors
- installation of poles and/or structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - characteristics and applications of different types of poles and associated hardware
  - techniques for installing poles and associated hardware:
    - types of installation equipment/tools
    - excavation methods
    - types of footings/foundations
    - types of attachments
    - earthing systems
    - clearances between conductors
    - safe methods of erecting and stabling poles and/or structures and cross-arms
  - techniques for maintenance of poles and associated hardware:
    - stabilisation techniques for unstable poles
    - methods of strengthen poles
    - maintenance and replacement of HV insulators and cross-arms
- procedures for installation and maintenance on public lighting structures and associated equipment encompassing:
  - standards, codes, legislation, supply authority regulations, local government and/or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment
  - safety precautions specific to working on street lighting:
    - safe working practices and procedures
    - safe clearances from LV and HV mains
    - working at heights, working in confined spaces, permit to work systems and isolation procedures, emergency response and rescue, including first aid
  - basic public lighting principles:
    - electromagnetic spectrum
    - principles of colour
    - behaviour of light
    - factors that affect illumination
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - street lighting circuits
    - earthing system
  - types of tools and equipment used for installation and maintenance

- types and function of lanterns/luminaires/lamps, control equipment, poles and associated hardware used for street lighting:
  - high-pressure mercury vapour, low pressure and high-pressure sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches and contactor boxes
- types of lighting systems:
  - overhead and underground street lighting systems
  - controlling and switching of lighting systems
- techniques for the installation of street lighting systems
- techniques for the maintenance of street lighting systems:
  - diagnosing of faults
  - removing, repairing, replacing and cleaning of public lighting and associated hardware
- application of specific testing equipment:
  - voltage detectors, insulation resistance testers, clamp-on ammeters, continuity testers and fault indictors
- techniques for the inspection, testing and commissioning of street lighting systems

- different types and functions of distribution components encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
  - types, function and characteristics of distribution components
  - safety policies, procedures and precautions related to the handling and installing of distribution components
- enterprise-specific switching diagrams and drawings encompassing:
  - types and application of enterprise-specific switching drawings and documents:
    - wiring and schematic diagrams and switching symbols
    - mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams
  - LV system switching diagrams
  - direct current (d.c.) traction supply sectioning diagrams
  - HV transmission and distribution system symbols and feeder plans
  - processes of updating switching diagrams
- power distribution network documentation encompassing:
  - requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types and application of power distribution network documentation drawings and documents:
    - wiring and schematic diagrams

    - drawings and switching symbols
    - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different diagrams and documentation on LV and HV systems:
    - overhead distribution extensions
    - underground distribution extensions
    - distribution substations
    - street lighting systems
- layout principles for overhead distribution encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to overhead distribution layout
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components, such as equipment, poles and cross-arms
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - resources needed for the stringing and maintenance of conductors
  - types of LV and HV overhead electrical conductor connections
  - minimum clearances between overhead conductors and LV and/HV structures
  - estimation of the duration of overhead distribution extension project
- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the surveying for an overhead and underground extension
  - techniques in measuring heights and distances
  - techniques in taking bearings/angles of deviation using a compass
  - techniques in using a clinometer
  - techniques in recording and storage of data
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
  - techniques in plotting long spans:
    - measuring stick, clinometer, trundle wheel and tapes
    - correction for sloping ground
    - distance across objects and range rods

- techniques in pegging pole positions:
  - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs
- fundamentals of computer-aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
  - types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and or upgrade
  - techniques in storing and retrieving programs and files from the computer
  - identification and methods of retrieving and manipulating digital symbols, designs, layouts, fonts and graphs stored in the computer
  - techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer, such as:
    - using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
  - calculation of dimensions and drafting measurements using the computer
  - techniques in the preparation of preliminary sketches using the computer
  - techniques in using 2-D computer graphics system and associated equipment to produce a distribution extension and/or upgrade draft or layout
  - techniques to diagnosing basic faults in computer operation
- principles to light design layout encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the light design principles
  - requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types of tariffs and charges
  - types of street lighting components:
    - column types, foundations, brackets, luminaries and mounting heights
  - types of electrical street lighting circuits:
    - types of supply, lighting circuit and control circuit
  - fundamentals of lighting production:
    - electromagnetic spectrum
    - visible and non-visible radiation
    - spectral energy distribution
    - infra-red, ultraviolet (UV), radiation safety, incandescence and phosphorescence
    - reflection and refraction
  - fundamentals of lighting concepts:
    - terms and units
    - purpose of reflectors and diffusers

- factors affecting external lighting design
- calculation of light output
- determining illuminance:
  - point to point method
  - lumen method
- determining rated life of luminaries
- fundamentals of street lighting design
- considerations for special lighting situations:
  - security lighting, hazardous street locations and emergency lighting

- principles to layout and draft a street lighting system encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to street lighting system layouts and drafts
  - requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components, such as equipment, poles and cross-arms
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - determination of street lighting positions for optimum visibility and to minimise traffic hazards
  - techniques in mounting and position of lights
  - resources needed for the installation of street lighting system
  - methods of pegging out of pole positions and/or underground cable positions
  - minimum clearances between overhead conductors and LV/and HV structures
  - estimation of the duration of overhead distribution extension project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry to undertake drafting and layout of a street lighting system.
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS011 Draft and layout a power system underground distribution extension

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the planning and layout of minor high voltage (HV) and low voltage (LV) underground distribution extensions, including the estimating of the costs and/or resources for the work to be undertaken. It also encompasses on-the-job design, surveying techniques, the pegging and/or marking out of the trench position, the pit/pillar position and the cable position according to the work order and enterprise requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to draft and layout an underground distribution extension	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the

		job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out drafting and layout of an underground distribution extension	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	The drafting and layout of an underground distribution extension is carried out in accordance with the work

		schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied for drafting and layout of an underground distribution extension to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete drafting and layout of an underground distribution extension	**3.1**	Work undertaken is checked against works schedule for conformance with requirements, anomalies are reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and the job is returned to service and advised to client/customer in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS32 Draft and layout a power system underground distribution extension.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS011 Draft and layout a power system underground distribution extension

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- drafting at least one (1) of the following:
  - high voltage (HV) multi-phase underground distribution extension plan/layout
  - a low voltage (LV) multi-phase underground distribution extension plan/layout
- laying out at least one (1) of the following:
  - a LV multi-phase underground distribution extension
  - a HV multi-phase underground distribution extension
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- installation of underground cable encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safety precautions specific to the installation of underground cables:
    - excavation and trench safety regulations
    - gas detection procedures
    - working in confined spaces
    - personal protective equipment (PPE)
    - hazards for the use of liquid petroleum gas (LPG) equipment for jointing of underground cables
    - gas bottle testing procedures
    - permit to work systems and isolation procedures

- trench excavation and reinstatement procedures
- installation of underground cable procedures:
  - types of tools and equipment
  - methods of installing conduits
  - methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
- procedures for the safe use of LPG equipment for cable jointing

- construction and types of underground cables encompassing:
  - safety precautions specific to handling underground cables
  - requirements for the use of enterprise manuals, system diagrams/plans and drawings
  - types and applications of underground cables
  - construction types and structures of underground cables
  - characteristics of different types of underground cables
  - ratings
- enterprise-specific switching diagrams and drawing encompassing:
  - types and application of enterprise-specific switching drawings and documents:
    - wiring and schematic diagrams and switching symbols
    - mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams:
    - LV system switching diagrams
    - direct current (d.c.) traction supply sectioning diagrams
    - HV transmission and distribution system symbols and feeder plans
    - processes of updating switching diagrams
- power distribution network documentation encompassing:
  - requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types and application of power distribution network documentation drawings and documents:
    - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different diagrams and documentation on LV and HV systems:
    - overhead distribution extensions
    - underground distribution extensions
    - distribution substations
    - street lighting systems
- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the

surveying for an overhead and underground extension
    - techniques in measuring heights and distances
    - techniques in taking bearings/angles of deviation using a compass
    - techniques in using a clinometer
    - techniques in recording and storage of data
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
    - techniques in plotting long spans:
        - measuring stick, clinometer, trundle wheel and tapes
        - correction for sloping ground
        - distance across objects and range rods
    - techniques in pegging pole positions:
        - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs
- fundamentals of computer-aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
    - types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and/or upgrade
    - techniques in storing and retrieving programs and files from the computer
    - identification and methods of retrieving and manipulating digital symbols, designs, layouts, fonts and graphs stored in the computer
    - techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer, such as:
        - using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
    - calculation of dimensions and drafting measurements using the computer
    - techniques in the preparation of preliminary sketches using the computer
    - techniques in using 2-D computer graphics system and associated equipment to produce a distribution extension and/or upgrade draft or layout
    - techniques to diagnosing basic faults in computer operation
- layout principles for underground mains distribution extension encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to underground mains distribution extension
    - requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
    - methods in determining material, equipment and tool lists:
        - components types and quantity required
        - spacing of components and equipment

    - costings of items and components
- purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
- determination of conductor size, type and route length
- resources needed for the laying of conductors
- determining the appropriate excavation for the location
- determining the size and depth of excavation
- determining the trench and pit layout procedures
- minimum clearances between conductors
- estimation of the duration of underground distribution extension project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS012 Investigate quality of power systems supply issues

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the technical investigation of quality of supply issues and recommending solutions. Quality of supply issues may include television and radio interference, voltage complaints, harmonics and system irregularities.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDRDS002 Design overhead distribution power systems

UETDRDS005 Design underground distribution power systems

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Pathway Unit Group 1

UETDRDS013 Organise and implement ESI line and easement surveys

UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure

Pathway Unit Group 2

UETDRDS006 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for and coordinate the investigation of issues in the quality of supply	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the investigation of issues in the quality of supply, are reviewed and determined
	1.2 Purpose of the investigation is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the investigation are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures

	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out and coordinate the investigation of issues in the quality of supply	**2.1**	Circuit/system modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Investigation decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures

	2.4	Mathematical models of the quality system are used to analyse the effectiveness of the finished product/service in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.9	Testing of supply quality is undertaken according to requirements and established procedures
3 Complete and coordinate the investigation of issues in the quality of supply	**3.1**	Final assessments of the quality of project are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the supply brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of quality assessment documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS42 Investigate quality of power systems supply issues.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS012 Investigate quality of power systems supply issues

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing six (6) technical solutions to issues relating to the following project types:
  - television and radio interference
  - voltage irregularities in an urban area
  - voltage irregularities in a rural area
  - voltage irregularities affecting an industrial/commercial customer
  - voltage irregularities in an underground area
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- detailed operation of fundamental test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters:
    - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence, and the use of oscilloscopes
- detailed operation of field device test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters:

    - measurement of voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices
- quality of supply measures encompassing:
    - measures, analysis and solutions for the following:
        - voltage variation outside of standards
        - voltage sags and swells
        - repeated fluctuations, impulses and momentary interruptions
        - frequency variation and harmonics - causes, effects and methods of minimisation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry to investigate quality of supply issues
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS013 Organise and implement ESI line and easement surveys

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the surveying of distribution and sub-transmission lines and easements for activities associated with the design and installation of electrical equipment. This activity encompasses the use of instruments, such as compasses, inclinometer and distance measuring devices, in accordance with customer requirements, nominated design specifications and company processes.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan and coordinate the organisation and implementation of line and easement surveys	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the organisation and implementation of line and easement surveys, are reviewed and determined
	1.2 Purpose of the line and easement surveys is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personnel protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and

		coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out and coordinate the organisation and implementation of line and easement surveys	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Survey project decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance

		specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.9	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
3 Complete and coordinate the organisation and implementation of line and easement surveys	**3.1**	Final assessment of the surveys is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of survey documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS45 Organise and implement ESI line and

easement surveys.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS013 Organise and implement ESI line and easement surveys

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing six (6) surveys of an overhead network relating to the following project types:
  - multi-pole extensions (distribution and sub-transmission)
  - in-line pole relocations (distribution and sub-transmission)
  - multi-circuit overhead lines (distribution and sub-transmission)
  - underground augmentation project
- completing designs, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the surveying for an overhead and underground extension
  - techniques in measuring heights and distances
  - techniques in taking bearings/angles of deviation using a compass
  - techniques in using a clinometer
  - techniques in recording and storage of data

- requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- techniques in plotting long spans:
  - measuring stick, clinometer, trundle wheel and tapes
  - correction for sloping ground
  - distance across objects and range rods
- techniques in pegging pole positions:
  - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs
- project management encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the duties and responsibilities for management of a project
  - analysis functions of project management to determine achievement of project objectives
  - relationship of stakeholders to the project
  - techniques in development of project plan:
    - project integration, scope, timelines, cost, quality, resources, communication/protocol requirements, risk/uncertainties and procurement and contacting
  - relationship between project processes, project life and project phases
  - planning and control procedures, resource management and risk management
  - techniques, methodologies and tools available to project managers
  - types of internal and external environmental factors that may affect the project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the preparation of detailed plans to be used during the design phase and preparation of as-built drawings during the construction phase and utilised by network owners as technical reference materials to detail system infrastructure. It includes the use of computer-aided drafting (CAD) or other relevant drafting methods.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for and coordinate the preparation and management of detailed construction plans for electrical system infrastructure	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures, which may influence the preparation and management of detailed construction plans for electrical system infrastructure, are reviewed and determined
	1.2 Purpose of the construction plans is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established organisational procedures, policies and specifications for the construction plans are obtained or established with appropriate personnel
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.5 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8 Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work

	1.9	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the preparation and management of detailed construction plans for electrical system infrastructure	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	Mathematical models of the system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.4	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.6	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.7	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the preparation and management of detailed construction plans for electrical system infrastructure	**3.1**	Final inspections of the construction plans are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to

relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of construction plan documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDS014 Prepare and manage detailed construction plans for electrical power system infrastructure

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- preparing six (6) compliant detailed plans that relate to the following project types:
  - overhead line designs
  - underground line designs
  - distribution substations designs
  - transmission and sub-transmission substation designs
  - public lighting designs
  - zone substation designs
  - customer substation designs
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage (ELV), low voltage (LV) and high voltage (HV) hazards and high current hazards encompassing:
  - risk management and assessment of risk:
    - principle and purpose of risk management and the processes for conducting a risk assessment
  - hazards associated with LV, ELV and HV:
    - arrangement of power distribution and circuits in an electrical installation

- parts of an electrical system and equipment that operate at LV and ELV
- parts of an electrical system and equipment where high currents are likely

- risks and control measures associated with HV:
  - parts of an electrical system and equipment that operate at HV
  - the terms 'touch voltage', 'step voltage', 'induced voltage' and 'creepage' as they relate to the hazards of HV and control measures used for dealing with the hazards of HV
- optical fibre safety:
  - coherent optical sources, joining procedures and laser safety class 3a devices or their replacement
- risks and control measures associated with LV:
  - modifying electrical installations, fault finding, maintenance and repair
  - control measures before, during and after working on electrical installations, circuits or equipment
  - isolation and tagging-off procedures
  - risks and restrictions of live work
  - control measures for live work
- risks and control measures associated with harmful dusts and airborne contaminants:
  - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials
- safety, selection, use, maintenance and care of test equipment:
  - safety characteristics of electrical testing devices
  - safe use of electrical testing device
  - checks and storage methods for maintaining the safety of testing devices

- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS management
  - relevance of enterprise management system to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management systems
  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assessing resources to establish and maintain WHS/OHS management systems
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system:
    - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions

- characteristics of a transmission, distribution and rail system:
  - principal components
  - typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
- relationship between an overhead and underground supply systems within an overall power system:
  - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- single line drawings and layouts:
  - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the HV equipment associated with substations

- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
    - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors:
    - types of LV and HV overhead electrical conductor connections
    - causes and effects of poor electrical connections
    - reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damaged conductors
    - minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation:
    - types and application of tools, equipment and hardware
    - methods of stringing, tensioning and termination of LV and HV conductors
- powerline safety practices encompassing:
  - protective apparatus and apparel for linework:
    - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
  - requirements for the use of ladders:
    - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole
    - maintenance checks on different types of ladders
    - renewal of extension ropes and the safety issues relating to clearances from overhead conductors
  - requirements for climbing and working aloft:
    - methods used to identify a pole is safe to climb
    - methods used to inspect a line worker's body belt

- application of knots and hitches appropriate to the requirements of a line worker
- height safety principles, including personal fall protection, prevention and related requirements
- practical procedures of climbing an overhead structure and fitting a pole chair

- traffic management:
  - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements
  - procedures used to provide an effective traffic management scheme and the use of a two-way radio
- control of small fires:
  - identification, selection and operation of the appropriate extinguishing mediums for various types of fires
  - general fire prevention methods
  - precautions for personal protection when fighting small fires
- rescue victims from heights and confined spaces:
  - planning and identifying procedures, and establishing responses and developing techniques
  - involvement of external emergency services
  - emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
- requirements for aerial linework:
  - planning, establishing and implementing relevant aviation authority clearances
  - determining system requirements
  - aircrew familiarisation with network operations and equipment
  - requirements for effective communications operations for aerial work

- implementation and monitoring requirements for powerline safety encompassing:
  - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of WHS/OHS in the workplace:
  - Commonwealth/state/territory legislation relevant to the workplace and the meaning of general duty of care under WHS/OHS legislation and common law
  - workplace WHS/OHS enterprise plan:
    - responsibilities of each member of the work team
    - review process for changing/improving WHS/OHS safety plan/standing instructions for the systematic management of WHS/OHS in the workplace
  - relationship between the WHS/OHS committee and employees:
    - methods used to collate and distribute/disseminate WHS/OHS information
    - staff development activities and legislation requirements with regards to WHS/OHS training
    - methods of addressing barriers such as literacy and cultural differences
    - provisions relating to WHS/OHS issue resolution
  - hazards associated with powerline industry:

- identification of hazards in the workplace
- processes used and contributing factors to a hazardous situation assessment of risks and control of WHS/OHS risks (risk management),
- the hierarchy of control and monitoring of risk control measures
- risk assessment and its management in powerline industry:
  - principles and purposes of risk management
  - processes for conducting risk assessment, including risk analysis and risk evaluation activities for selecting and implementing appropriate options for eliminating or minimising risk
- maintenance strategies for WHS/OHS programs:
  - developing processes for promoting, maintaining and improving WHS/OHS in the workplace
  - identify techniques for the evaluating and reviewing WHS/OHS education and training programs and elements of an effective WHS/OHS management system
  - WHS/OHS consultation and accident/incident investigations
- principles of safe design encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
  - application of safe design principles:
    - safe design duty-related information
    - safe design process related information and safe design evaluations
- HV single wire earth return (SWER) system encompassing:
  - application and function of SWER system components
  - circuit arrangement
  - principle of operation
  - hazards and procedures associated with faulty SWER earth systems
  - procedure to isolate, energise and commission SWER substations
- enterprise-specific switching diagrams and drawing encompassing:
  - types and application of enterprise-specific switching drawings:
    - wiring and schematic diagrams and switching symbols
    - mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams:
    - LV system switching diagrams
    - direct current (DC) traction supply sectioning diagrams
    - HV transmission and distribution system symbols and feeder plans
    - processes of updating switching diagrams
- power distribution network documentation encompassing:

- requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
- types and application of power distribution network documentation drawings and documents:
  - wiring and schematic diagrams
  - drawings and switching symbols
  - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
- interpretation of different diagrams and documentation on LV and HV systems:
  - overhead distribution extensions
  - underground distribution extensions
  - distribution substations
  - street lighting systems

- system components and layouts encompassing:
  - distribution system layouts:
    - overhead/underground
    - urban/rural
    - HV customers
    - high-rise building systems
    - three phase lines and single phase lines
    - SWER systems
    - spur, parallel and ring systems
    - typical substation types
  - transmission system layouts:
    - lines, buses, transformers and cables
    - line/bus layouts, including single, double, ring and breaker, and half systems
    - HV crossing methods
- circuit breaker auxiliary systems encompassing:
  - types and characteristics of high-pressure air systems, including air storage and air handling processes
  - types and characteristics of DC systems, including battery types, charging systems and protection systems
  - types and characteristics of special ambient gases (SF6) systems, including gas conditioning, storage and handling systems
  - types and characteristics of vacuum interrupters
  - types and characteristics of oil filled and oil handling
- DC transmission systems encompassing:
  - structure of DC transmission systems
  - types of equipment required for DC transmission systems
  - types of connections used for DC transmission systems

- principles of control of DC transmission systems
- advantages of DC transmission in comparison to alternating current (AC) transmission
- disadvantages of DC transmission in comparison to AC transmission

- AC transmission line electrical parameters encompassing:
  - typical arrangements
  - parameters of significance
  - calculation of line parameters:
    - calculation of resistive, inductive and capacitive values assuming regular transposition and solid conductors
  - comparison with actual values
  - typical parameter values and ratios for different voltage level lines
- AC transmission line models encompassing:
  - types of transmission line models based on line length
  - calculation of voltage drop, line regulation and transmission efficiency
  - load sharing between lines
- voltage control techniques encompassing:
  - conditions leading to voltage collapse
  - effects on system of HV and LV
  - voltage control devices:
    - voltage regulators applied to generators and synchronous phase modifiers
    - electromagnetic voltage regulators
    - series and parallel capacitors
    - on-load tap changer (OLTC) transformers and static VAR compensators (SVC) - SVC's include saturated reactor compensators; thyristor controlled reactor compensators and combined systems
  - production of harmonics and methods of harmonic control
  - location of voltage control devices within the system
- voltage control devices encompassing:
  - typical devices applications and capacities
  - estimation of rating of VAR regulating devices using graphical techniques
- corona encompassing:
  - factors leading to the generation of corona:
    - voltage levels
    - conductor spacings, conductor sizes and shaping
    - atmospheric conditions
  - consequences of corona
  - corona reduction:
    - conductor selection
    - conductor bundling
    - conductor surface treatment

- grading rings
- internal discharge:
  - causes of internal discharge
  - effects of internal discharge
  - testing techniques
- protection system types encompassing:
  - requirements of a protection scheme:
    - relationship to primary system design
    - purpose of protection, safety of persons and protection of plant
    - system instability
    - system break up
    - loss of customers and loss of revenue
    - protection zones
    - restricted schemes and unrestricted schemes
    - duplicate protection
    - local backup protection and remote backup protection
    - selectivity, discrimination, stability, sensitivity and reliability
  - components of a protection scheme:
    - current transformers, potential transformers, summation current transformers, interposing transformers and multi-tapped transformers
    - all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor-based relays and gas relays
    - thermal sensors
    - hardwired communication
    - powerline carrier systems
    - microwave systems
    - fibre optic systems
    - need for isolation
    - need for interfacing
  - protection applied to buses:
    - overload, differential, earth leakage, structure leakage, combined schemes and protection overlap
  - protection applied to transformers:
    - biased differential, gas, winding temperature and oil temperature
  - protection applied to single/radial lines:
    - overcurrent, earth leakage, slow earth leakage, distance, auto reclose, sectionalising and over voltage
  - protection applied to interconnected lines:
    - overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current comparison, distance, impedance, admittance and offset.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for detailed construction plans for electrical system infrastructure
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU001 Conduct high voltage testing of underground power cable system

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to conduct high voltage (HV) testing of an electricity supply industry (ESI) underground power system.

It includes testing using direct current (d.c.) or alternating current (a.c.) voltage methods to identify cable system defects.

It also includes interpreting the test results to determine the integrity of the cable system.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct HV testing of underground power cable system	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work instruction is obtained and confirmed in accordance with workplace requirements
	1.3 Work is prioritised and sequenced for completion in accordance with work instruction and workplace requirements
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work permits are organised in accordance with workplace requirements
	1.6 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.7 Testing method is determined and appropriate test equipment is obtained and confirmed in working order in accordance with the work instruction and workplace requirements
	1.8 Worksite is prepared in accordance with the work instruction and workplace requirements
	1.9 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out the testing of a HV underground power cable system	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working in confined spaces and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements

	2.4	Test equipment is positioned, set up for testing and confirmed to be operating correctly
	2.5	Cable is confirmed de-energised in accordance with workplace requirements
	2.6	Work permits are received and signed in accordance with workplace requirements
	2.7	Cable is prepared for testing and test equipment connected to the cable in accordance with workplace requirements
	2.8	Cable system is tested to determine the integrity of the system in accordance with workplace requirements
	2.9	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work instruction and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Work permits are signed off in accordance with workplace requirements
	3.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector

Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS59 Conduct high potential testing of power system underground power cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU001 Conduct high voltage testing of underground power cable system

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - handling underground power cables
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- interpreting and using drawings, diagrams and instructions
- using at least one (1) of the following cable testing methods:
  - insulation resistance (IR)
  - very low frequency (VLF) alternating current (a.c.) withstand or monitored withstand
  - direct current (d.c.) withstand
- completing at least three (3) of the following cable tests:
  - sheath integrity
  - core insulation resistance
  - tan delta
  - partial discharge
  - high voltage (HV) withstand (VLF a.c.)
  - HV withstand (d.c.)
- analysing the testing result to determine the integrity of the cable system
- using testing equipment in accordance with workplace requirements
- recording test results in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - working in confined spaces
  - trench safety
  - manual handling
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- work instruction requirements, including:
  - types of and layout of drawings
  - cable routes
  - manufacturer's instructions
  - testing standards
  - workplace documentation procedures
- HV paper insulated and polymeric cables, including:
  - types and sizes
  - construction, characteristics and properties
  - minimum bending radius
- HV testing requirements, including:
  - cable handling techniques
- types of and causes of cable defects, including:
  - poor jointing techniques (joints and terminations)
  - cracking or rupturing of cross-linked polyethylene (XLPE) or paper cable insulation
  - insulation porosity or other material defects
  - impurity inclusion or other contaminants in the main insulation
  - internal voids either in main insulation or in joints and terminations
  - water treeing
  - electrical trees
  - protrusions in the semi-conductive layers
  - insulation surface scratches or scoring
  - overheating by excess current

  - insulation damage due to voltage transients
  - mechanical damage to the outer sheath
- HV testing methods
- advantages and disadvantages of different HV testing methods
- HV failure of insulation
- use of HV testing equipment
- HV testing procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used for conducting HV testing of underground power cable system
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and manufacturer's instructions.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU002 Inspect underground electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to inspect underground electrical apparatus in the electricity supply industry (ESI).

It includes visually inspecting and identifying defective, damaged or faulty electrical apparatus and reporting inspection outcomes.

It also includes determing the cause of defective, damaged or faulty electrical apparatus.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

UETDREL005 Work safely in the vicinity of live electrical apparatus

or

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect underground electrical apparatus	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.6 Liaison and communication with stakeholders is carried out in accordance with workplace requirements
	1.7 Worksite is prepared in accordance with the work plan and workplace requirements
	1.8 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out inspection of underground electrical apparatus	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 The use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Underground electrical apparatus is visually inspected in accordance with work plan and workplace requirements
	2.5 Underground electrical apparatus defect or damage is identified in accordance with workplace requirements
	2.6 Underground electrical apparatus defect or damage cause is determined
	2.7 Incidents or unplanned events are responded to in

		accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.4	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit. No Equivalent Unit.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU002 Inspect underground electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- inspecting underground electrical apparatus, including:
  - transformers
  - switchgear
  - pole mounted cable and cable terminations
  - pillars
  - switchboards
  - earthing systems
- identifying underground electrical apparatus defects and damage
- determining the cause of underground electrical apparatus defects and damage
- using software applications or workplace documents for:
  - accessing and verifying existing data
  - capturing or recording data
  - categorising and recording defects
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice, and organisational workplace requirements, including:

  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- construction manuals, system diagrams/plans and drawings
- procedures for workplace records, reports and documentation
- types, function and operation of underground electrical apparatus, including:
  - transformers
  - switchgear
  - pole mounted cable and cable terminations
  - pillars
  - switchboards
  - earthing systems
- installation requirements for underground electrical apparatus, including:
  - construction
  - connection
  - earthing
- types and causes of underground electrical apparatus defects and damage.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for inspecting underground electrical apparatus.
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU003 Install and maintain gas and oil pressure systems for specialised underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the installation, maintenance and repair of oil and gas pressure systems for specialised underground cables. It includes the undertaking of pressure control activities, the installation of gauges, oil tanks and gas cubicles. It also includes knowledge of oil route profiles as well as the operation of pressure equipment for jointing works, and the repairing and replacing of pressure systems. It also encompasses the procedures associated with performing accessory impregnation, oil flow testing, the processes for oil degasification and performing leak location of pressure systems.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDRDU009 Install, test and verify distribution underground cable installations

UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

UETDRDU016 Lay power cables

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS008 Install and maintain electrical apparatus

UETDRIS011 Install and maintain low voltage underground services

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to install and maintain oil and gas pressure systems for specialised underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained, analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according

		to established procedures
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the installation and maintenance of oil and gas pressure systems for specialised underground cables	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to

		immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Installation and/or maintenance of oil and gas pressure systems for specialised underground cables are carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe installation and/or maintenance of oil and gas pressure systems for specialised underground cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the installation and maintenance of oil and gas pressure systems for specialised underground cables	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and underground cables are returned to service and advised to client/customer in accordance with requirements

3.6 Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ32 Install and maintain gas and oil pressure systems for specialised underground cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU003 Install and maintain gas and oil pressure systems for specialised underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- installing and maintaining oil and gas filled pressure systems
- using all of the following oil and gas processing and control equipment:
  - gas analyser/detector
  - cable freezing equipment
  - accessory impregnation equipment
  - oil degasification plant
  - manometers
  - flow boards
  - vacuum pumps
  - site bottles
  - gas cylinders
  - liquid nitrogen cylinders
  - pressure/vacuum meters
  - oil evacuation pumps
  - oil and gas piping equipment
  - oil sampling equipment
- using all of the following gas processing and control equipment:
  - gas control cubicles
  - oil control cubicles
  - oil degasification units
  - oil pressure tanks
- undertaking jointing and terminating of oil or gas filled specialised underground cables
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the working with oil or gas filled specialised underground cables
  - types of oil or gas filled specialised underground cables - properties of paper insulation, oil and nitrogen gas, construction, reasons for gas and/or oil filled, characteristics and capabilities of the cable, pressure/volume characteristics of oil and gas, and precautions when handling
  - types and functions of tools and equipment used on oil or gas filled specialised underground cables
  - techniques when handling, storing and disposing of oil or gas filled specialised underground cables
- installation of oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the installation of oil or gas filled specialised underground cables
  - safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE),including intrinsically safe equipment for use in confined and hazardous environments; permit/authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
  - types, function and serviceability of tools and equipment used for the installation of oil or gas filled specialised underground cables
  - techniques in the safe installation of oil or gas filled specialised underground cables
  - techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful installation has occurred
- jointing and termination of oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to working with oil or gas filled specialised underground cables
  - safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE, including intrinsically safe equipment for use in confined and hazardous environments; permit/authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
  - types, function and serviceability of tools and equipment used for the jointing and terminating of oil or gas filled specialised underground cables

  - techniques in the safe jointing and terminating oil or gas filled specialised underground cables
  - techniques in the safe testing of the oil or gas filled specialised underground cables to ensure successful jointing and/or termination has occurred
- maintenance of oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the maintenance of oil or gas filled specialised underground cables
  - safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE, including intrinsically safe equipment for use in confined and hazardous environments; permit/authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
  - safe storage and disposal of oil or gas filled specialised underground cables and associated equipment and components
  - types, function and serviceability of tools and equipment used for the maintenance of oil or gas filled specialised underground cables
  - techniques in the safe maintenance of oil or gas filled specialised underground cables
  - techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful maintenance has occurred
- oil and gas pressurised systems for specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of oil and gas pressurised systems
  - safe storage and disposal of oil or gas pressurised equipment and associated components
  - requirements for the use of manuals, system diagrams/plans, drawings, charts and layouts
  - characteristics, application and care of hand and specialised tools
  - techniques in determining route profiles and access locations
  - pressure system characteristics for oil filled and gas filled cables
  - techniques in the safe installation of oil and gas pressurised systems
  - techniques in the safe maintenance of oil and gas pressurised systems
  - techniques in the safe use of tools and equipment in the process of installation and maintenance of oil and gas pressurised systems - gas analyser/detector, manometers, flow boards, cable freezing equipment, accessory impregnation equipment, oil degasification plant, manometers, flow boards, vacuum pumps, site bottles, gas cylinders, pressure/vacuum meters, oil evacuation pumps, Residual Gas Pressure (RGP) equipment, oil sampling equipment, gas control cubicles, oil control cubicles, cable joints and terminations, oil degasification units and oil pressure tanks
- enterprise-specific policies and procedure instructions encompassing:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations

  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relations, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents encompassing:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU004 Install and maintain network infrastructure HV underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the installation and maintenance of de-energised high voltage (HV) underground cables and covers the laying of cables as well as the jointing, terminating, repair and replacement of cables. It includes direct laying of cables in trenches, on racks, in troughs and/or in conduit or ducts, and the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning and/or recommissioning tests and the updating of system data/maintenance records.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETDRDU005 Install and maintain network infrastructure LV underground cables

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRIS009 Install and maintain ESI network infrastructure electrical equipment

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare the laying, installation and maintenance of de-energised HV underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and

		identified for all worksites
	1.3	Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the laying, installing and maintenance of HV underground cables are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5	Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.8	Relevant personnel at worksite are confirmed current in first aid and other related work procedures according to requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved to carry out work, where necessary
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
	1.12	Road signs, barriers and warning devices are positioned in accordance with requirements
2 Carry out the laying, installation and	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and

maintenance of HV underground cables		minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed
	2.3	Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures
	2.4	Essential knowledge and associated skills are applied in the safe installation and maintenance of HV underground polymeric cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Electrical cables are laid in accordance with the work schedule and requirements/established procedures
	2.6	De-energised HV underground cables are installed according to the work schedule and requirements/established procedures
	2.7	Maintenance, including repair and/or replacement of de-energised HV underground cables, is carried out in accordance with the work schedule and requirements/established procedures
	2.8	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.9	Unplanned events in the installation and maintenance of HV underground cables are undertaken within the scope of established procedures
	2.10	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.11	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the laying, installation and maintenance of HV	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures

underground cables

3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable

3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permits are signed off and HV underground cables are returned to service in accordance with requirements

3.6 Work completion records, reports, as installed/modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ34 Install and maintain network infrastructure HV underground cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU004 Install and maintain network infrastructure HV underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- laying at least one (1) of the following cable types:
  - high voltage (HV) polymeric
  - HV paper insulated
- laying HV cables using at least one (1) of the following installation methods:
  - direct lay
  - on racks
  - in conduits
- laying HV cables using at least one (1) cable pulling method of the following:
  - stocking pulling
  - bond pulling
  - armour pulling
  - nose pull attachments
- sealing HV cables using at least two (2) of the following cable sealing methods:
  - heat shrinkable
  - pre-stretched materials
  - tin/lead wiping
  - pre-moulded components
- cutting HV cables using at least one (1) of the following cable cutting methods:
  - hydraulic cutters
  - electric reciprocating
  - motorised
  - hand tools
- laying HV cables using at least four (4) of the following supporting plant and equipment:

  - drum jacks
  - winches
  - spindles
  - capstans
  - bollards
  - cable trailers
  - rollers
  - lubricants
  - ropes
  - bell mouths
  - draw wires/rods
- joining HV cables using at least two (2) of the following jointing methods:
  - tee-off joints
  - straight through joint
  - parallel branch joint
  - parallel joint
- incorporating at least one (1) of the following:
  - transformers
  - ring main units
  - chamber substations
- incorporating at least one (1) of the following:
  - busbar/termination boxes
  - links/fuses
  - termination boxes
  - control gear
  - circuit breakers
- jointing and terminating HV cables using at least two (2) of the following material types:
  - resin filled boxes
  - compound filled boxes
  - polymeric tape
  - heat shrink
  - ‘slip-on’ moulds
  - pre-stretched polymeric
- testing HV cables using all the following testing and recording equipment:
  - insulation resistance testers
  - voltage detectors
- incorporating all the following:
  - cable identification devices
  - cable spiking devices

- incorporating at least two (2) of the following:
  - mechanical connectors
  - compression connectors
  - lugs
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of HV underground polymeric cables
- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings encompassing:
  - characteristics of different types of cables and components
  - purpose of stress control
  - applications of various tools and equipment for HV jointing
- procedure for isolating HV underground cables encompassing:
  - method for proving safe to work
  - earthing procedures
- techniques in jointing HV underground polymeric cable encompassing:
  - short circuit cores and seal cable
  - straight through
  - trifurcating
- techniques in HV terminations encompassing:
  - pole top termination
  - substation/switchgear termination
  - ABC termination
  - telcon termination
- procedures for repairing HV underground cables encompassing:
  - location of faults
  - types of damage
  - techniques to repairs to sheath
  - techniques to repairs to core.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU005 Install and maintain network infrastructure LV underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the installation and maintenance of de-energised low voltage (LV) underground cables and covers the laying of cables as well as the jointing, terminating, repair and replacement of cables. It also includes direct laying of cables in trenches, on racks, in troughs and/or in conduit or ducts; and the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning and/or recommissioning tests and the updating of system data/maintenance records.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRIS009 Install and maintain ESI network infrastructure electrical equipment

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for the laying, installation and maintenance of underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

	1.3	Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the laying, installing and maintenance of LV underground cables are obtained and confirmed for the purposes of the work to be performed and communicated
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5	Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed to be in working order
	1.8	Relevant personnel at worksite are confirmed current in first aid and other related work procedures according to requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved to carry out work where necessary
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
	1.12	Road signs, barriers and warning devices are positioned in accordance with requirements
2 Carry out the laying, installation and maintenance of LV	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in

underground cables		accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working in confined spaces and working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency checked according to requirements confirmed
	2.3	Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures
	2.4	Essential knowledge and associated skills are applied for the safe installation and maintenance of LV underground cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Electrical cables are laid in accordance with the work schedule and requirements/established procedures
	2.6	De-energised LV underground cables are installed according to the work schedule and requirements/established procedures
	2.7	Maintenance, including repair and/or replacement of de-energised LV underground cables, is carried out in accordance with the work schedule and requirements/established procedures
	2.8	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.9	Unplanned events in the laying, installing and carrying out the maintenance of LV underground cables are undertaken within the scope of established procedures
	2.10	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.11	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the laying, installation and maintenance of LV underground cables	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures

3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable

3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permits are signed off and LV underground cables are returned to service in accordance with requirements

3.6 Work completion records, reports, drawings and/or documentation and information are finalised and processed, and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ33 Install and maintain network infrastructure LV underground cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU005 Install and maintain network infrastructure LV underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- laying at least one (1) of the following low voltage (LV) cable types:
  - LV polymeric
  - LV paper insulated
- laying LV cables using at least one (1) of the following installation types:
  - direct lay
  - on racks
  - in conduits
- laying LV cables using at least one (1) of the following cable pulling methods:
  - stocking pulling
  - bond pulling
  - armour pulling
  - nose pull attachments
- sealing LV cables using at least two (2) of the following cable sealing methods:
  - heat shrinkable
  - pre-stretched materials
  - tin/lead wiping
  - pre-moulded components
- cutting LV cables using at least one (1) of the following cable cutting methods:
  - hydraulic cutters
  - electric reciprocating
  - motorised
  - hand tools
- laying LV cables using at least four (4) of the following supporting plant and equipment:

  - drum jacks
  - winches
  - spindles
  - capstans
  - bollards
  - cable trailers
  - rollers
  - lubricants
  - ropes
  - bell mouths
  - draw wires/rods
- joining LV cables using at least two (2) of the following jointing methods:
  - tee-off joints
  - straight through joints
  - parallel branch joints
  - parallel joints
- terminating LV cables in/on at least two (2) of the following locations:
  - transformers
  - LV switchboards
  - pillars/turrets
  - lighting columns
  - ring main units
  - chamber substations
- terminating LV cables using at least two (2) of the following types of equipment:
  - busbar/termination boxes
  - links/fuses
  - disconnect boxes
  - termination boxes
  - control gear
  - underground/overhead terminations
  - circuit breakers
- jointing and terminating LV cables using at least one (1) of the following material types:
  - resin filled boxes
  - compound filled boxes
  - polymeric tape
  - heat shrink
  - ‘slip-on’ moulds
  - pre-stretched polymeric
- terminating LV cables using at least one (1) of the following connectors:

  - compression lugs
  - welded connections
  - mechanical connectors
  - insulation piercing connectors
- testing LV cables using all of the following testing and recording equipment:
  - insulation resistance testers
  - voltage detectors
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the HV equipment associated with substations
- substations, power transformers and reactors encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of high voltage (HV) equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers; operation under load/no-load conditions; types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation of equipment
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - description, purpose and characteristics of a reactors
- powerline safety practices encompassing:
  - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
  - requirements for the use of ladders - carrying, erecting, collapsing and lowering different

types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from overhead conductors

- requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedures of climbing an overhead structure and fitting a pole chair
- traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- rescue victims from heights and confined spaces - planning and identifying procedures; establishing responses; developing techniques; involvement of external emergency services; and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
- requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work

- procedures in providing store support encompassing:
  - classification and identification of equipment, components and tools
  - procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security and bookkeeping/record keeping
  - material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks and forklifts
  - cable drum handling equipment
  - safety procedures - storage and care of safety equipment; handling hazardous materials; storage of hazardous substances and dangerous goods; depot safety procedures; manufacturer and supplier information, including material safety data sheets (MSDS)
- installation of underground cable encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal protective equipment (PPE), hazards for the use of liquid petroleum gas (LPG) equipment for jointing of underground cable, gas bottle testing procedures, permit to work systems and isolation procedures
  - trench excavation and reinstatement procedures
  - installation of underground cable procedures - types of tools and equipment, methods of installing conduits, methods of installing cables and sealing cable ends (direct buried,

ducts cleated and racked)
    - procedures for the safe use of LPG equipment for cable jointing
- LV polymeric cable jointing principles encompassing:
    - techniques in jointing LV cross-linked polyethylene (XLPE) cables - straight through joint, jointing different types of cable and service and street light cable joints
    - techniques in terminating LV XLPE - pole top terminations, substation terminations, distribution pillar /column/cubicle terminations and service and street light cable terminations
    - techniques in repairing LV XLPE cable - different types of damage, repairs to sheath and repairs to cores
    - methods of testing cable after jointing
- jointing and termination of LV polymeric cable encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of LV polymeric cables
    - types of cables - single core, multi-core and XLPE insulation
    - methods of cable handling - direct laid cables, duct laid cables, solid laid cables and cables supported in cleats or hangers
    - corrosion protection
    - minimum bending radius of cables
    - methods of cable sealing - shorting of cables cores and core of un-terminated cables
    - methods of protection from corrosion
    - polymeric sheathed cables sealing with mastic lined
    - heat shrink caps buried sealed ends
    - types of jointing tools - general hand tools and compression tools
    - techniques in the use of LPG - safety precautions, PPE, general maintenance and repair
    - safety precautions when cable jointing -working in confined spaces; permit to work systems and isolation procedures; and emergency rescue/response, including first aid
- underground cables construction and types encompassing:
    - safety precautions specific to handling underground cables
    - requirements for the use of enterprise manuals, system diagrams/plans and drawings
    - types and applications of underground cables
    - construction types and structures of underground cables
    - characteristics of different types of underground cables
    - ratings.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU006 Install and maintain polymeric specialised underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the installation, maintenance and repair of polymeric specialised underground cables, including cross-linked polyethylene (XLPE) and ethylene propylene rubber (EPR) above 33 kV. It includes jointing and terminating, as well as working under induced voltages and undertaking the relevant tests required for jointing. It also encompasses the preparation of the cable jointing bay, the preparation of cables and phasing out, cable identification and spiking, and the treatment/handling of, but not jointing fibre optical cables.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDRDU009 Install, test and verify distribution underground cable installations

UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

UETDRDU016 Lay power cables

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS008 Install and maintain electrical apparatus

UETDRIS011 Install and maintain low voltage underground services

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to install and maintain polymeric specialised underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.5 Risk control measures are identified, prioritised and evaluated against the work schedule

	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the installation and maintenance of polymeric specialised underground cables	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according

		to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Installation and\or maintenance of polymeric specialised underground cables is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe installation and/or maintenance of polymeric specialised underground cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the installation and maintenance of polymeric specialised underground cables	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and underground cables are returned to service and advised to client/customer in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are

confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ31 Install and maintain polymeric specialised underground cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU006 Install and maintain polymeric specialised underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- installing and maintaining at least one (1) of the following specialised 33 kV and above cable types:
  - cross-linked polyethylene (XLPE) cables
  - ethylene propylene rubber (EPR) cables
- undertaking jointing and terminating including all of the following:
  - straight through joints
  - terminations
- using at least three (3) of the following specialised cable installation equipment:
  - winches
  - caterpillars
  - rollers
  - bond lines
  - nose pull devices
  - drum jacks
- connecting cable conductors using at least two (2) of the following:
  - compression lugs
  - welded connections
  - mechanical connectors
- using cable terminating materials including at least two (2) of the following:
  - compound and resin filled boxes
  - air boxes
  - gas filled boxes
  - polymeric tape
  - polymeric heat shrink

  - slip-on moulds
  - pre-stretched polymeric materials
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- polymeric specialised underground cables principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the working with polymeric specialised underground cables
  - types of polymeric specialised underground cables – construction, characteristics and capabilities of the polymeric specialised cable, pressure/volume characteristics of oil and gas, and precautions when handling
  - types and functions of tools and equipment used on polymeric specialised underground cables
  - techniques when handling polymeric specialised underground cables
- installation and maintenance of polymeric specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of polymeric specialised underground cables
  - safety precautions of working with polymeric specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
  - types, function and serviceability of tools and equipment used for the installation of polymeric specialised underground cables
  - techniques in the safe installation of polymeric specialised underground cables
  - techniques in the safe maintenance of polymeric specialised underground cables
  - techniques in the safe testing/inspection of the polymeric specialised underground cables to ensure successful installation and/or maintenance has occurred
- jointing and termination of polymeric specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the working with polymeric specialised underground cables
  - safety precautions of working with polymeric specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE; authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including

first aid
    - types, function and serviceability of tools and equipment used for the jointing and terminating of polymeric specialised underground cables
    - techniques in the safe jointing and terminating polymeric specialised underground cables
    - techniques in the safe testing of the polymeric specialised underground cables to ensure successful jointing and/or termination has occurred
- enterprise-specific policies and procedure instructions encompassing:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures
    - rules and regulations
    - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
    - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
    - overview of enterprise professional development - firefighting procedures, fatigue management, training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
    - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
    - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
    - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
    - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
    - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents encompassing:
    - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
    - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
    - title box - description of parts and version control.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU007 Install and maintain underground public lighting

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain underground public lighting in the electricity supply industry (ESI).

It includes installing poles/columns, hardware, underground cable and control equipment.

It also includes testing and commissioning, inspecting and maintaining public lighting.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain underground public lighting	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Work permits are received and signed in accordance with workplace requirements
	1.8 Worksite is prepared in accordance with the work plan and workplace requirements
	1.9 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.10 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.11 Traffic management plan is confirmed as being in place in accordance with workplace requirements

2 Carry out installation of underground public lighting	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights, the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Excavation/foundation is inspected for compliance with the work plan and workplace requirements
	2.7	Pole/column, hardware and control equipment is assembled in accordance with the work plan and workplace requirements
	2.8	Pole/column is erected and stabilised in accordance with the work plan and workplace requirements
	2.9	Earthing is installed in accordance with the work plan and workplace requirements
	2.10	Cable is laid and connected at the pole/column connection point and at the pillar
	2.11	Public lighting is tested and commissioned in accordance with the work plan and workplace requirements
	2.12	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.13	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Carry out maintenance of underground public lighting	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Lifting, working at heights, and the use of plant, tools, equipment and PPE are carried out in accordance with

		workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	3.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	3.6	Public lighting is inspected in accordance with workplace requirements
	3.7	Public lighting is maintained in accordance with the work plan and workplace requirements
	3.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	3.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.5	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.6	Work permits are signed off in accordance with workplace requirements
	4.7	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit. No equivalent unit.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU007 Install and maintain underground public lighting

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- installing public lighting, including:
  - poles/columns
  - cable
  - lanterns/luminaires
  - outreach arms
  - fuses
  - control equipment
- replacing public lighting poles/columns
- maintaining public lighting hardware, including replacing any three (3) of the following:
  - luminaires
  - lamps
  - fuses
  - cable
  - control equipment
- identifying/diagnosing public lighting faults
- rectifying public lighting faults
- conducting at least three (3) of the following tests:

  - polarity*
  - voltage
  - continuity
  - insulation resistance
  - neutral identification
  - loop impedance
  - earth resistance
  - (*must do)
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - installation and maintenance of public lighting
  - inspection, testing and commissioning of public lighting
  - live low voltage (LV) connection principles
- hazard, risk assessment and risk control requirements including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods
- construction manuals, system diagrams/plans and drawings for public lighting
- basic lighting principles
- types and function of poles/columns and outreach arms
- types, function and operation of luminaires/lamps
- types, function and operation of control equipment
- controlling and switching of public lighting
- maintenance of public lighting, including:
  - types of faults and causes
  - repairing and replacing poles/columns, hardware and control equipment

- cleaning hardware.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and maintaining underground public lighting.
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU008 Install gas and oil filled specialised underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the installation, jointing and termination of oil and gas filled specialised underground cables from 33 kV and higher. It includes the laying of the specialised underground ground cable, the preparation of the cables and phasing out jointing and terminating and the preparation of the cable jointing bay. It also encompasses the relevant safety procedures to ensure installation of the specialised cable is undertaken according to established enterprise requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDRDU009 Install, test and verify distribution underground cable installations

UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

UETDRDU016 Lay power cables

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS008 Install and maintain electrical apparatus

UETDRIS011 Install and maintain low voltage underground services

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to install oil and gas filled specialised underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.4 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures

	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the installation of oil and gas filled specialised underground cables	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according

		to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Installation of oil and gas filled specialised underground cables is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe installation of oil and gas filled specialised underground cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the installation of oil and gas filled specialised underground cables	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permit(s) are signed off and underground cables are returned to service and advised to client/customer in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ29 Install gas and oil filled specialised underground cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU008 Install gas and oil filled specialised underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- installing the following pressurised 33 kV and above cable types:
  - oil filled cables
  - gas filled cables
- using all of the following equipment:
  - specialised cable installation equipment
  - winches
  - caterpillars
  - rollers
  - bond lines
  - drum jacks
  - cable end caps/nose pull assemblies
- performing at least two (2) of the following jointing methods:
  - straight through joint
  - straight stop joint
  - trifurcating joint
  - splitter joint
  - trifurcating/transition/stop
- performing at least one (1) of the following termination methods:
  - box termination
  - gas filled termination
  - compound filled termination
- performing at least two (2) of the following connectors:
  - welded connectors

  - mechanical connectors
  - compression connectors
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- oil and gas filled specialised underground cable principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the working with oil or gas filled specialised underground cables
  - types of oil or gas filled specialised underground cables - properties of paper insulation, oil and nitrogen gas, construction, reasons for gas and/or oil filled, characteristics and capabilities of the cable, and pressure/volume characteristics of oil and gas
  - precautions when handling
  - types and functions of tools and equipment used on oil or gas filled specialised underground cables
  - techniques when handling, storing and disposing of oil or gas filled specialised underground cables
- installation of oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the installation of oil or gas filled specialised underground cables
  - safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE), including intrinsically safe equipment for use in confined and hazardous environments; permit/authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
  - types, function and serviceability of tools and equipment used for the installation of oil or gas filled specialised underground cables
  - techniques in the safe installation of oil or gas filled specialised underground cables
  - techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful installation has occurred
- jointing and terminating oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to jointing and terminating oil or gas filled specialised underground cables
  - safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE, including intrinsically safe equipment for use in confined and hazardous environments; permit/authorisation to work

systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
    - types, function and serviceability of tools and equipment used for the jointing and terminating of oil or gas filled specialised underground cables
    - techniques in the safe jointing and terminating oil or gas filled specialised underground cables
    - techniques in the safe testing of the oil or gas filled specialised underground cables to ensure successful jointing and/or termination has occurred
- enterprise-specific policies and procedure instructions encompassing:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures
    - rules and regulations
    - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
    - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
    - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
    - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
    - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
    - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
    - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
    - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records and first aid/medical records
- enterprise-specific technical drawing and documents encompassing:
    - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
    - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
    - title box - description of parts and version control.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU009 Install, test and verify distribution underground cable installations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit consolidates critical knowledge and skills developed throughout the term of the qualification to install, test and verify distribution underground cable installations in the electricity supply industry (ESI).

It includes the jointing, terminating and testing of underground cable and electrical equipment and the connection and testing of a customer connection.

It also includes verifying the cable installation complies with the work plan and workplace requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

CPCCLDG3001 Licence to perform dogging

TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDRDU002 Inspect underground electrical apparatus

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS008 Install and maintain electrical apparatus

UETDRIS011 Install and maintain low voltage underground services

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install, test and verify underground cable installations	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Work permits are received and signed in accordance with workplace requirements

	1.8	Worksite is prepared in accordance with the work plan and workplace requirements
2 Carry out installation, testing and verifying of underground cable installations	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Manual handling, working in confined spaces, and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Cable is prepared and tested in accordance with the work plan and workplace requirements
	2.5	Cable jointing, terminating and testing is carried out in accordance with the work plan and workplace requirements
	2.6	Electrical equipment is tested in accordance with the work plan and workplace requirements
	2.7	Low voltage (LV) service installation is connected and tested in accordance with the work plan and workplace requirements
	2.8	Cable installation is verified in accordance with the work plan and workplace requirements
	2.9	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.4	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.5	Work permits are signed off in accordance with

workplace requirements

3.6 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ99 Test and verify distribution cable jointing installations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU009 Install, test and verify distribution underground cable installations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- interpreting and using drawings, diagrams and instructions
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- completing at least one (1) of the following low voltage (LV) joints:
  - tee-off
  - straight
  - breech
- completing at least one (1) of the following high voltage (HV) joints:
  - tee-off
  - straight
  - breech
- completing at least one (1) of the following LV terminations:
  - pole top
  - transformer
  - LV switchboard
  - pillar/turret
  - lighting column
- completing at least one (1) of the following HV terminations:
  - pole top
  - transformer
  - switchgear
- completing at least two (2) of the following cable tests:
  - voltage
  - continuity

  - insulation resistance
  - phase identification
- installing electrical equipment, including:
  - testing electrical equipment
  - testing earthing systems
- connecting a LV service cable
- testing consumer/customer connections, including at least five (5) of the following:
  - neutral integrity*
  - polarity*
  - voltage
  - current
  - phase rotation
  - insulation resistance
  - neutral identification
  - loop impedance
  - earth resistance
  - (*must do)
- verifying cable installations, including:
  - complying with the work plan
  - identifying and rectifying non-compliance issues
- using testing equipment in accordance with workplace requirements
- recording test results in accordance with workplace requirements
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements including:
  - WHS/OHS
  - live LV connection principles
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- construction manuals, system diagrams/plans and drawings
- HV and LV cable installation, including:

  - cable jointing and terminating procedures
  - testing procedures
- electrical equipment installation, including:
  - construction and connection procedures
  - testing procedures
- LV service installation, including:
  - connection procedures
  - testing procedures
- cable installation verification procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing, testing and verifying underground cable installations
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU010 Joint, terminate and maintain energised low voltage underground paper insulated cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to joint, terminate and maintain energised low voltage (LV) underground paper insulated cable in the electricity supply industry (ESI).

It includes jointing, terminating, repairing and the testing of cable in existing installations.

It also includes using a range of tools, specialised equipment, materials and manufacturer instructions.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDRDU014 Joint, terminate and maintain low voltage underground paper insulated cable

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to joint, terminate and maintain energised LV underground paper insulated cable	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Work permits are received and signed in accordance with workplace requirements
	1.8 Work site is prepared in accordance with the work plan and workplace requirements
2 Carry out jointing, terminating and maintenance of energised LV underground paper insulated cable	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Manual handling, working in confined spaces and use of tools, equipment and PPE are carried out in accordance with workplace requirements

	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Specialised equipment is used in accordance with workplace requirements
	2.5	Cable is prepared for jointing, terminating and maintenance in accordance with manufacturer instructions and workplace requirements
	2.6	Cable is tested before jointing or terminating in accordance with the work plan and workplace requirements
	2.7	Cable is jointed, terminated and maintained in accordance with manufacturer instructions and workplace requirements
	2.8	Cable is tested after jointing or terminating in accordance with the work plan and workplace requirements
	2.9	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.10	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are signed off in accordance with workplace requirements
	3.7	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ24 Joint and maintain energised low voltage underground paper insulated cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU010 Joint, terminate and maintain energised low voltage underground paper insulated cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - protecting existing underground services
  - handling underground power cables
  - using liquefied petroleum gas (LPG)
  - applying shoring requirements
  - applying low voltage (LV) energised work principles
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- interpreting and using drawings, diagrams and instructions
- completing at least one (1) of the following cable joints:
  - tee-off
  - straight
  - breech
- completing at least one (1) of the following cable terminations:
  - LV switchboard
  - pillar/turret
  - lighting column
- using at least two (2) of the following cable jointing/terminating products:
  - resin
  - heat shrink
  - cold applied
- completing at least one (1) of the following earth bond methods:

  - lead wiping
  - mechanical
- using at least two (2) of the following cable conductor connection methods:
  - mechanical connector
  - compression lug
  - insulating piercing connector
- completing at least one (1) of the following cable maintenance tasks:
  - outer sheath repair
  - insulation repair
- completing at least two (2) of the following cable tests:
  - moisture content*
  - voltage
  - insulation resistance
  - phase identification
  - phase rotation
  - *(must do)
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - LV energised work principles and procedures
  - specialised equipment for LV energised work
  - working in confined spaces
  - excavation and trench safety
  - LPG equipment and testing
  - safe approach distances
  - manual handling
- hazard, risk assessment and risk control requirements including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- cable alignment and identification

- work plan requirements, including:
  - types of and layout of drawings
  - manufacturer's instructions
  - testing plan
  - quality checklist
  - workplace documentation procedures
- LV paper insulated cable, including:
  - types and sizes
  - construction, characteristics and properties
  - minimum bending radius
- cable jointing, terminating and maintenance requirements:
  - cable handling techniques
  - energised jointing, terminating and maintenance principles, techniques and procedures
  - earth bonding methods and procedures
  - types of cable damage/defects
  - cable repair techniques and procedures
  - testing procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used for jointing, terminating and maintaining energised LV underground paper insulated cable
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and manufacturer's instructions.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU011 Joint, terminate and maintain energised low voltage underground polymeric cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to joint, terminate and maintain energised low voltage (LV) underground polymeric cable in the electricity supply industry (ESI).

It includes jointing, terminating, repairing and testing of cable in existing installations.

It also includes using a range of tools, specialised equipment, materials and manufacturer's instructions.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to joint, terminate and maintain energised LV underground polymeric cable	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Work permits are received and signed in accordance with workplace requirements
	1.8 Worksite is prepared in accordance with the work plan and workplace requirements
2 Carry out the jointing, terminating and maintenance of energised LV underground polymeric cable	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Manual handling, working in confined spaces and use of tools, equipment and PPE are carried out in accordance with workplace requirements

	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Specialised equipment is used in accordance with workplace requirements
	2.5	Cable is prepared for jointing, terminating or maintenance in accordance with manufacturer's instructions and workplace requirements
	2.6	Cable is tested before jointing or terminating in accordance with the work plan and workplace requirements
	2.7	Cable is jointed, terminated or maintained in accordance with manufacturer's instructions and workplace requirements
	2.8	Cable is tested after jointing or terminating in accordance with the work plan and workplace requirements
	2.9	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.10	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are signed off in accordance with workplace requirements
	3.7	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ28 Joint and maintain energised low voltage underground polymeric cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU011 Joint, terminate and maintain energised low voltage underground polymeric cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - protecting existing underground services
  - handling underground power cables
  - using liquefied petroleum gas (LPG)
  - applying shoring requirements
  - applying low voltage (LV) energised work principles
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- interpreting and using drawings, diagrams and instructions
- completing at least two (2) of the following cable joints:
  - tee-off
  - straight
  - breech
- completing at least one (1) of the following cable terminations:
  - LV switchboard
  - pillar/turret
  - lighting column
- using at two (2) of the following cable jointing/terminating methods:
  - resin
  - heat shrink
  - cold applied
- using at least two (2) of the following cable conductor connection methods:
  - compression lug

    - insulation piercing connector
    - mechanical connector
- completing at least one (1) of the following cable maintenance tasks:
    - outer sheath repair
    - insulation repair
- completing at least two (2) of the following cable tests:
    - voltage
    - insulation resistance
    - phase identification
    - phase rotation
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
    - WHS/OHS
    - LV energised work principles and procedures
    - specialised equipment for LV energised work
    - working in confined spaces
    - excavation and trench safety
    - LPG equipment and testing
    - safe approach distances
    - manual handling
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- cable alignment and identification
- work plan requirements, including:
    - types of and layout of drawings
    - manufacturer's instructions
    - testing plan
    - quality checklist
    - workplace documentation procedures

- LV polymeric cables, including:
  - types and sizes
  - construction, characteristics and properties
  - minimum bending radius
- cable jointing, terminating and maintenance requirements, including:
  - cable handling techniques
  - energised jointing, terminating and maintenance principles, techniques and procedures
  - types of cable damage/defects
  - cable repair techniques and procedures
  - testing procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used for jointing, terminating and maintaining energised LV underground polymeric cable
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and manufacturer's instructions.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to joint, terminate and maintain high voltage (HV) underground paper insulated cable in the electricity supply industry (ESI).

It includes jointing, terminating and the testing of cable in new installations. It also includes maintaining cable in existing installations, including repairing, replacing, re-jointing or re-terminating and testing of de-energised cable.

It includes using a range of tools, equipment, specialised materials and manufacturer's instructions.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to joint, terminate and maintain HV underground paper insulated cable	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Worksite is prepared in accordance with work plan and workplace requirements
2 Carry out jointing and terminating of HV underground paper insulated cable in new installations	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Manual handling, working in confined spaces, the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements

	2.4	Cable is tested before jointing or terminating in accordance with work plan and workplace requirements
	2.5	Cable is prepared for jointing or terminating in accordance with the work plan and workplace requirements
	2.6	Cable is jointed or terminated in accordance with the work plan and workplace requirements
	2.7	Cable is tested after jointing or terminating in accordance with work plan and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Carry out maintenance of de-energised HV underground paper insulated cable	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Manual handling, working in confined spaces, the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Cable is identified and spiked or cut in accordance with workplace requirements
	3.5	Work permit is received and signed in accordance with workplace requirements
	3.6	Cable is tested before maintenance in accordance with the work plan and workplace procedures
	3.7	Cable is prepared for maintenance in accordance with manufacturer's instructions and workplace requirements
	3.8	Cable is maintained in accordance with manufacturer's instructions and workplace requirements
	3.9	Work permits are signed off in accordance with workplace requirements

	3.10	Cable, cable joint or termination is tested in accordance with the work plan and workplace requirements
	3.11	Incidents or unplanned events are responded to in accordance with workplace requirements
	3.12	Quality checks of work are undertaken in accordance with work plan and workplace requirements
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - protecting existing underground services
  - handling underground power cables
  - using liquefied petroleum gas (LPG)
  - applying shoring requirements
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- interpreting and using drawings, diagrams and instructions
- completing at least one (1) of the following cable joints:
  - tee-off
  - straight
  - breech
- completing at least one (1) of the following cable terminations:
  - pole top
  - transformer
  - switchgear
- using at least one (1) of the following cable jointing/terminating products:
  - taped resin
  - heat shrink
  - cold applied
- completing at least one (1) of the following earth bond methods:
  - lead wiping
  - mechanical

- completing at least one (1) of the following cable maintenance tasks:
  - outer sheath repair
  - insulation repair
- completing at least one (1) of the following to determine the cable electrical status:
  - spiking
  - guillotine/remote cutting
- completing at least three (3) the following cable tests:
  - moisture content*
  - voltage
  - continuity
  - insulation resistance
  - phase identification
  - (*must do)
- using at least one (1) of the following cable conductor connection methods:
  - compression lug
  - mechanical connector
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safe work practices, including:
  - working in confined spaces
  - excavation and trench safety
  - LPG equipment and testing
  - cable spiking, guillotine/remote cutting
  - manual handling
- cable alignment and identification

- work plan requirements, including:
  - types of and layout of drawings
  - manufacturer's instructions
  - construction manuals
  - testing plan
  - quality checklist
  - workplace documentation procedures
- high voltage (HV) paper insulated cables, including:
  - types and sizes
  - construction, characteristics and properties
  - minimum bending radius
- cable jointing, terminating and maintenance requirements, including:
  - cable handling techniques
  - jointing, terminating and maintenance principles, techniques and procedures
  - earth bonding methods and procedures
  - cable moisture testing procedures
  - types of cable damage/defects
  - use of test equipment
  - testing procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for jointing, terminating and maintaining HV underground paper insulated cable
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to joint, terminate and maintain high voltage (HV) underground polymeric cable in the electricity supply industry (ESI).

It includes jointing, terminating and the testing of cable in new installations. It also includes maintaining cable in existing installations, including repairing, replacing, re-jointing or re-terminating and testing of de-energised cable.

It includes using a range of tools, equipment, specialised materials and manufacturer's instructions.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to joint, terminate and maintain HV underground polymeric cable	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Worksite is prepared in accordance with the work plan and workplace requirements
2 Carry out the jointing and terminating of HV underground polymeric cable in new installations	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Manual handling, working in confined spaces and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements

	2.4	Cable is tested before jointing or terminating in accordance with the work plan and workplace procedures
	2.5	Cable is prepared for jointing or terminating in accordance with manufacturer's instructions and workplace requirements
	2.6	Cable is jointed or terminated in accordance with manufacturer's instructions and workplace requirements
	2.7	Cable is tested after joining or terminating in accordance with the work plan and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Carry out the maintenance of de-energised HV underground polymeric cable	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Manual handling working in confined spaces and the use of tools, equipment and PPE are followed in accordance with workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Cable is identified and spiked or cut in accordance with workplace requirements
	3.5	Work permits are received and signed in accordance with workplace requirements
	3.6	Cable is tested in accordance with the work plan and workplace requirements
	3.7	Cable is prepared for maintenance in accordance with manufacturer's instructions and workplace requirements
	3.8	Cable is maintained in accordance with manufacturer's instructions and workplace requirements
	3.9	Work permits are signed off in accordance with

		workplace requirements
	3.10	Cable, cable joint and termination are tested in accordance with the work plan and workplace requirements
	3.11	Incidents or unplanned events are responded to in accordance with workplace requirements
	3.12	Quality checks of work are undertaken in accordance with work plan and workplace procedures
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - protecting existing underground services
  - handling underground power cables
  - using liquefied petroleum gas (LPG)
  - applying shoring requirements
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- interpreting and using drawings, diagrams and instructions
- completing at least one (1) of the following cable joints:
  - tee-off
  - straight through
  - breech
- using at least one (1) of the following cable jointing/terminating products:
  - taped resin
  - heat shrink
  - cold applied
- completing at least two (2) of the following cable terminations:
  - pole top
  - transformer
  - switchgear
- using the following cable connection methods:
  - mechanical connector
  - compression lug

- completing at least one (1) of the following cable maintenance tasks:
  - repair outer sheath
  - replace termination lug
- completing at least one (1) of the following to determine cable electrical status:
  - spiking
  - guillotine/remote cutting
- completing at least two (2) of the following cable tests:
  - voltage
  - continuity
  - insulation resistance
  - phase identification
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - working in confined spaces
  - excavation and trench safety
  - LPG equipment and testing
  - cable spiking, guillotine/remote cutting
  - manual handling
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of permits
- events that constitute an incident or unplanned event
- procedures for responding to an unplanned event or incident
- cable alignment and identification
- work plan requirements, including:
  - types of and layout of drawings
  - manufacturer's instructions
  - testing plan
  - quality checklist
  - workplace documentation procedures

- high voltage (HV) polymeric cables, including:
  - types and sizes
  - construction, characteristics and properties
  - electrical stress control
  - minimum bending radius
- cable jointing, terminating and maintenance requirements, including:
  - cable handling techniques
  - jointing principles, techniques and procedures
  - cable repair techniques and procedures
  - types of cable damage/defects
  - use of test equipment
  - testing procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used for jointing, terminating and maintaining HV underground polymeric cable
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and manufacturer's instructions.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU014 Joint, terminate and maintain low voltage underground paper insulated cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to joint, terminate and maintain low voltage (LV) underground paper insulated cable in the electricity supply industry (ESI).

It includes jointing, terminating and the testing of cable in new installations. It also includes maintaining cable in existing installations including repairing, replacing, re-jointing or re-terminating and testing of de-energised cable.

It includes using a range of tools, equipment, specialised materials and manufacturer's instructions.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to joint, terminate and maintain LV underground paper insulated cable	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Worksite is prepared in accordance with workplace requirements
2 Carry out jointing and terminating of LV underground paper insulated cable in new installations	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Manual handling, working in confined spaces and use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements

	2.4	Cable is tested before jointing or terminating in accordance with the work plan and workplace requirements
	2.5	Cable is prepared for jointing or terminating in accordance with workplace requirements
	2.6	Cable is jointed or terminated in accordance with workplace requirements
	2.7	Cable is tested after jointing or terminating in accordance with the work plan and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Carry out the maintenance of de-energised LV underground paper insulated cable	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Manual handling, working in confined spaces and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Cable is identified and spiked or cut in accordance with workplace requirements
	3.5	Work permits are received and signed in accordance with workplace requirements
	3.6	Cable is tested before the maintenance in accordance with the work plan and workplace procedures
	3.7	Cable is prepared for maintenance in accordance with manufacturer's instructions and workplace requirements
	3.8	Cable is maintained in accordance with manufacturer's instructions and workplace requirements
	3.9	Work permits are signed off in accordance with

		workplace requirements
	3.10	Cable, cable joint or termination is tested in accordance with the work plan and workplace requirements
	3.11	Incidents or unplanned events are responded to in accordance with workplace requirements
	3.12	Quality checks of work are undertaken in accordance with work plan and workplace procedures
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.5	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ22 Install and maintain de-energised low voltage underground paper insulated cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU014 Joint, terminate and maintain low voltage underground paper insulated cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - protecting existing underground services
  - handling underground power cables
  - using liquefied petroleum gas (LPG)
  - applying shoring requirements
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- interpreting and using drawings, diagrams and instructions
- completing at least one (1) of the following cable joints:
  - tee-off
  - straight
  - breech
- completing at least one (1) of the following cable terminations:
  - pole top
  - transformer
  - low voltage (LV) switchboard
  - pillar/turret
- using at least one (1) of the following cable jointing/terminating products:
  - taped resin
  - heat shrink
  - cold applied
- completing at least one (1) of the following earth bond methods:
  - lead wiping

    - mechanical
- completing at least one (1) of the following cable maintenance tasks:
    - outer sheath repair
    - insulation repair
- completing at least one (1) of the following to determine the cable electrical status:
    - spiking
    - guillotine/remote cutting
    - safe/live cut
- completing at least three (3) the following cable tests:
    - moisture content*
    - voltage
    - continuity
    - insulation resistance
    - phase identification
    - (*must do)
- using at least one (2) of the following cable conductor connection methods:
    - compression lug
    - mechanical connector
    - insulation piercing connector
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
    - WHS/OHS
    - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safe work practices, including:
    - working in confined spaces
    - excavation and trench safety
    - LPG equipment and testing

    - cable spiking, guillotine/remote cutting or safe/live cut
    - manual handling
- cable alignment and identification
- work plan requirements, including:
    - layout of drawings
    - manufacturer's instructions
    - construction manuals
    - testing plan
    - quality checklist
    - workplace documentation procedures
- LV paper insulated cables, including:
    - types and sizes
    - construction, characteristics and properties
    - minimum bending radius
- cable jointing, terminating and maintenance requirements, including:
    - cable handling techniques
    - jointing principles, techniques and procedures
    - earth bonding methods and procedures
    - cable moisture testing procedures
    - types of cable damage/defects
    - use of test equipment
    - testing procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for jointing, terminating and maintaining LV underground paper insulated cable
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and manufacturer's instructions.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to joint, terminate and maintain low voltage (LV) underground polymeric cable in the electricity supply industry (ESI).

It includes jointing, terminating and the testing of cable in new installations. It also includes maintaining cable in existing installations including repairing, replacing, re-jointing or re-terminating and testing of de-energised cable.

It includes using a range of tools, equipment, specialised materials, and manufacturer's instructions.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to joint, terminate and maintain LV underground polymeric cable	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Worksite is prepared in accordance with work plan and workplace requirements
2 Carry out the jointing and terminating of LV underground polymeric cable in new installations	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Manual handling, working in confined spaces and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements

	2.4	Cable is tested before jointing or terminating in accordance with the work plan and workplace requirements
	2.5	Cable is prepared for jointing or terminating in accordance with the work plan and workplace requirements
	2.6	Cable is jointed or terminated in accordance with manufacturer's instructions and workplace requirements
	2.7	Cable is tested after jointing or terminating in accordance with the work plan and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Carry out the maintenance of de-energised LV underground polymeric cable	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Manual handling, working in confined spaces and use of tools, equipment and PPE are carried out in accordance with workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Cable is identified and spiked or cut in accordance with workplace requirements
	3.5	Work permits are received and signed in accordance with workplace requirements
	3.6	Cable is tested before the maintenance in accordance with the work plan and workplace procedures
	3.7	Cable is prepared for maintenance in accordance with manufacturer's instructions and workplace requirements
	3.8	Cable is maintained in accordance with manufacturer's instructions and workplace requirements

	3.9 Work permits are signed off in accordance with workplace requirements
	3.10 Cable is tested after maintenance in accordance with the work plan and workplace requirements
	3.11 Incidents or unplanned events are responded to in accordance with workplace requirements
	3.12 Quality checks of work are undertaken in accordance with work plan and workplace procedures
4 Complete work and documentation	**4.1** Completed work is checked for compliance against the work plan and workplace requirements
	4.2 Incidents or unplanned events are reported in accordance with workplace requirements
	4.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4 Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.6 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ26 Install and maintain de-energised low

voltage underground polymeric cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - protecting existing underground services
  - handling underground power cables
  - using liquefied petroleum gas (LPG)
  - applying shoring requirements
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- interpreting and using drawings, diagrams and instructions
- completing at least two (2) of the following cable joints:
  - tee-off
  - straight
  - breech
- completing at least two (2) of the following cable terminations:
  - pole top
  - transformer
  - low voltage (LV) switchboard
  - pillar/turret
  - lighting column
- using at least two (2) of the following cable jointing/terminating products:
  - resin filled
  - heat shrink
  - cold applied
- using at least two (2) of the following cable conductor connection methods:

    - compression lug
    - mechanical connector
    - insulation piercing connector
- completing at least one (1) of the following cable maintenance tasks:
    - outer sheath repair
    - insulation repair
    - core repair
- completing at least one (1) of the following to determine the cable electrical status:
    - cable spiking
    - guillotine/remote cutting
    - safe/live cut
- completing at least two (2) of the following cable tests:
    - voltage
    - continuity
    - insulation resistance
    - phase identification
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
    - WHS/OHS
    - working in confined spaces
    - excavation and trench safety
    - LPG equipment and testing
    - cable spiking, guillotine/remote cutting or safe/live cut
    - safe approach distances
    - manual handling
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- cable alignment and identification
- work plan requirements, including:

  - types of and layout of drawings
  - manufacturer's instructions
  - testing plan
  - quality checklist
  - workplace documentation procedures
- LV polymeric cables, including:
  - types and sizes
  - construction, characteristics and properties
  - minimum bending radius
- cable jointing, terminating and maintenance requirements:
  - cable handling techniques
  - jointing, terminating and maintenance principles, techniques and procedures
  - types of cable damage/defects
  - cable repair techniques and procedures
  - use of test equipment
  - testing procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used for jointing, terminating and maintaining LV underground polymeric cable
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and manufacturer's instructions.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU016 Lay power cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to lay power cables in the electricity supply industry (ESI).

It includes positioning and using plant and equipment for direct laying of cables in trenches, on racks and in conduit or ducts.

It also includes bedding and protecting cables, cable pulling methods, sealing cable ends and backfilling the excavation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Not applicable.

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to lay power cable	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to

		be performed are referred to and confirmed
	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4	Plant, tools, equipment, and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5	Communication method for the laying is confirmed with other workers
	1.6	Hazards are identified, risks assessed and control measures identified and applied
	1.7	Cable route is confirmed, excavated and bedded in accordance with the work plan and workplace requirements
	1.8	Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.9	Worksite is prepared in accordance with the work plan and workplace requirements
	1.10	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out laying of power cable	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working in confined spaces, the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Cable laying plant and equipment is positioned in accordance with the work plan and workplace requirements
	2.5	Conduit and cable are laid, cable is bedded and protected in accordance with the work plan and workplace requirements

	2.6 Communication with other workers is maintained during the laying of cables in accordance with the work plan and workplace requirements
	2.7 Cable ends are sealed in accordance with the work plan and workplace requirements
	2.8 Backfilling is confirmed in accordance with the work plan and workplace requirements
	2.9 Incidents or unplanned events are responded to in accordance with workplace requirements
	2.10 Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1** Completed work is checked for compliance against the work plan and workplace requirements
	3.2 Incidents or unplanned events are reported in accordance with workplace requirements
	3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4 Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6 Personnel are notified of work completion in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ21 Lay ESI electrical cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU016 Lay power cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - using liquefied petroleum gas (LPG)
  - excavation/trench safety
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- interpreting and using drawings, diagrams and instructions
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- laying of cables, including:
  - high voltage (HV) polymeric
  - low voltage (LV) polymeric
  - laying and sealing conduits
  - positioning cable laying plant and equipment
  - sealing cable ends
  - bedding and protecting cables
- backfilling open trench in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - excavation/trench safety
  - use of LPG
- hazard, risk assessment and risk control requirements, including potential hazards

- types and application of PPE
- safe use of plant, tools and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- diagrams/plans
- power cables, including:
  - cables types and sizes
  - cable construction and bending radius
- cable laying, including:
  - excavation/trenching
  - conduit laying and sealing
  - cable alignments and depths
  - plant, tools and equipment for cable laying
  - clearance from other underground cables or buried utilities
  - cable handling
  - cable laying methods
  - cable pulling methods
  - cable tensioning methods
  - cable protection methods
  - cable sealing
  - bedding and backfilling.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for laying power cables
- applicable documentation, including workplace requirements, relevant industry standards, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU017 Locate faults in underground power cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to locate faults in underground power cables in the electricity supply industry (ESI).

It includes setting up test equipment and using the equipment to pre locate and pinpoint the cable fault. It also includes interpreting test results, documenting the fault location and likely cause and listing recommendations for correcting the cable fault.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to locate underground power cable faults	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work instruction is obtained and confirmed in accordance with workplace requirements
	1.3 Tools, equipmentand personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with work instruction and workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Worksite is prepared in accordance with the work instruction and workplace requirements
2 Carry out the locating of underground power cable faults	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working in a confined space, and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Test equipment is positioned, set up for testing and confirmed to be operating correctly
	2.5 Cable is tested and confirmed de-energised in accordance with workplace requirements
	2.6 Work permits are received and signed in accordance with workplace requirements

	2.7 Cable is prepared for testing and test equipment connected to the cable in accordance with workplace requirements
	2.8 Cable is tested to pre-locate the cable fault in accordance with workplace requirements
	2.9 Cable is tested to pinpoint the location of the cable fault in accordance with workplace requirements
	2.10 Cable faults are identified and analysed in accordance with workplace requirements
	2.11 Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1** Recommendations for rectification are made in accordance with workplace requirements
	3.2 Incidents or unplanned events are reported in accordance with workplace requirements
	3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4 Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5 Work permits are signed off in accordance with workplace requirements
	3.6 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS58 Locate faults in power system underground power cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU017 Locate faults in underground power cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- interpreting and using drawings, diagrams and instructions
- using at least one (1) of the following cable fault pre location methods for low resistance faults:
  - time-domain reflectometry (TDR)
  - bridge method (e.g. Murray Loop)
- using at least one (1) of the following cable fault prelocation methods for high resistance faults:
  - arc reflection
  - voltage decay
  - impulse current
  - bridge (Murray loop)
- using at least one (1) of the following cable fault pinpointing methods:
  - acoustic detection using surge generator (thumper)
  - audio frequency pinpointing using twist method
  - fault sniffing
  - step voltage (pool of potential test or earth gradient method)
- locating at least three (3) of the following cable faults:
  - short circuit
  - open circuits

    - high resistance
    - earth and sheath
    - humid and wet
    - flashing
- analysing the testing results to determine the type and location of fault
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
    - WHS/OHS
    - safe approach distances
    - working in confined spaces
    - trench safety
    - manual handling
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of work permits
- events that constitute an incident or unplanned event
- procedures for responding to an unplanned event or incident
- work instruction requirements, including:
    - types of and layout of drawings
    - cable routes
    - manufacturer's instructions
    - workplace documentation procedures
- high voltage (HV) and low voltage (LV) paper insulated and polymeric cables, including:
    - types and sizes
    - construction, characteristics and properties
    - minimum bending radius
- cable fault location, including:
    - types of and causes of cable defects
    - types of and causes of cable faults
    - low resistance cable fault pre-location methods
    - high resistance cable fault pre-location methods
    - cable fault pinpointing methods

- advantages and disadvantages of different testing methods
- types of cable fault locating equipment
- use of cable fault locating equipment
- cable fault locating procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for locating faults in underground power cables
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU018 Maintain gas and oil filled specialised underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the maintenance and repair of oil and gas filled specialised underground cables 33 kV and above. It includes testing, diagnosing faults, repairing and replacing the specialised cables. It also encompasses the processes for preliminary pressure control and leak repair, as well as working under induced voltages, cable identification and cable freezing.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDRDU008 Install gas and oil filled specialised underground cables

UETDRDU009 Install, test and verify distribution underground cable installations

UETDRDU012 Joint, terminate and maintain high voltage underground paper insulated cable

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

UETDRDU016 Lay power cables

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS008 Install and maintain electrical apparatus

UETDRIS011 Install and maintain low voltage underground services

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to maintain oil and gas filled specialised underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures

	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out the maintenance of oil and gas filled specialised underground cables	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures

	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Maintenance of oil and gas filled specialised underground cables is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe maintenance of oil and gas filled specialised underground cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the maintenance of oil and gas filled specialised underground cables	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and underground cables are returned to service and advised to client/customer in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ30 Maintain gas and oil filled specialised underground cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU018 Maintain gas and oil filled specialised underground cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- installing all of the following pressurised 33 kV and above cable types:
  - oil filled cables
  - gas filled cables
- performing at least two (2) of the following jointing methods:
  - straight through joint
  - straight stop joint
  - trifurcating joint
  - splitter joint
  - trifurcating/transition/stop joint
- performing at least one (1) of the following termination methods:
  - air box terminator
  - gas filled terminator
  - compound filled terminator
- connecting cable conductors using at least two (2) of the following:
  - welded connectors
  - mechanical connectors
  - compression connectors
- using specialist testing devices including all of the following:
  - voltage detectors
  - cable identification equipment and spiking
  - insulation resistance testers
- using/applying all of the following equipment and materials:
  - leak repair and pressure control cable freezing equipment

  - pressure control tapes
  - fittings and seals
- undertaking preparation for cable freezing, preliminary pressure control and leak repair activities
- using cable terminating materials, including at least two of the following:
  - paper tape
  - polymeric tape
  - heat shrink
  - slip-on moulds
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the maintenance of oil or gas filled specialised underground cables
- safety precautions of working with oil or gas filled specialised underground cables encompassing:
  - safe operation procedures
  - WHS/OHS hazards and precautions
  - dangers of working in confined spaces
  - identification of WHS/OHS hazards, and assessing and controlling risks
  - types, selection, maintenance, storage and uses of personnel protective equipment (PPE), including intrinsically safe equipment for use in confined and hazardous environments
  - permit/authorisation to work systems and isolation procedures
  - safe working policies, procedures and practices when using/operating specialised equipment
  - emergency response and rescue, including first aid
- safe storage and disposal of oil or gas filled specialised underground cables and associated equipment and components; types, function and serviceability of tools and equipment used for the maintenance of oil or gas filled specialised underground cables; and techniques in the safe maintenance of oil or gas filled specialised underground cables
- techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful maintenance has occurred.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRDU019 Transition joint high voltage paper insulated cable to high voltage polymeric cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to transition joint high voltage (HV) paper insulated cable to HV polymeric cable in the electricity supply industry (ESI).

It includes confirming that the cables are de-energised and the testing of cables using a range of tools, equipment, specialised materials and manufacturer's instructions.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Distribution Underground

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to transition HV paper insulated cable to HV polymeric cable	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Work permits are organised in accordance with workplace requirements
	1.8 Worksite is prepared in accordance with the work plan and workplace requirements
2 Carry out the transitioning of HV paper insulated cable to HV polymeric cable	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Manual handing, working in confined spaces and use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance

		with workplace requirements
	2.4	Cable is identified and spiked or cut in accordance with workplace requirements
	2.5	Work permits are received and signed in accordance with workplace requirements
	2.6	Cables are tested in accordance with workplace requirements
	2.7	Cables are prepared for jointing in accordance with manufacturer instructions and workplace requirements
	2.8	Cables are jointed in accordance with manufacturer instructions and workplace requirements
	2.9	Work permits are signed off in accordance with workplace requirements
	2.10	Cables and cable joint are tested in accordance with workplace requirements
	2.11	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.12	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ25 Perform straight through high voltage paper insulated to polymeric transition joint.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRDU019 Transition joint high voltage paper insulated cable to high voltage polymeric cable

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - protecting existing underground services
  - handling underground power cables
  - using liquefied petroleum gas (LPG)
  - applying shoring requirements
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- interpreting and using drawings, diagrams and instructions
- jointing at least one (1) of the following cable types:
  - belted paper insulated cable to polymeric
  - screened paper insulated cable to polymeric
- completing at least one (1) of the following cable joints:
  - three core paper insulated to three core polymeric
  - three core paper insulated to 3 x 1 core polymeric
  - three core paper insulated to trifurcated three core polymeric
  - single core paper insulated to single core polymeric
- using at least one (1) of the following cable jointing/terminating products:
  - taped resin
  - heat shrink
  - cold applied
- completing at least one (1) of the following earth bond methods:
  - lead wiping
  - mechanical

- using at least one (1) of the following cable conductor connection methods:
  - compression lug
  - mechanical connector
- completing at least one (1) of the following to determine the cable electrical status:
  - spiking
  - guillotine/remote cutting
- completing at least three (3) of following cable tests:
  - moisture content*
  - continuity
  - insulation resistance
  - phase identification
  - (*must do)
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - working in confined spaces
  - excavation and trench safety
  - LPG equipment and testing
  - cable spiking, guillotine/remote cutting
  - safe approach distances
  - manual handling
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- cable alignment and identification
- work plan requirements, including:
  - types of and layout of drawings
  - manufacturer's instructions
  - testing plan
  - quality checklist

- completion of workplace documentation
- high voltage (HV) paper insulated and polymeric cables, including:
  - types and sizes
  - construction, characteristics and properties
  - electrical stress control
  - minimum bending radius
- cable jointing, terminating and maintenance requirements, including:
  - cable handling techniques
  - jointing principles, techniques and procedures
  - earth bonding methods and procedures
  - cable moisture testing procedures
  - types of cable damage/defects
  - cable repair techniques and procedures
  - use of test equipment
  - testing procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for transitioning HV paper insulated cable to HV polymeric cable
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and manufacturer's instructions.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDREL001 Apply environmental requirements

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to apply environmental requirements in the electricity supply industry (ESI).

It includes participating in and contributing to environmental requirements for specific projects/sites, identifying and controlling possible environmental risks and impacts, and recording and reporting environmental incidents.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Not applicable.

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to apply environmental requirements	**1.1** Environmental legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and

		confirmed
	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Environmental hazards are identified, risks assessed and control measures identified and applied
	1.4	Work permits/approvals are organised in accordance with workplace requirements
	1.5	Plant, materials, vehicles, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.6	Worksite is prepared in accordance with the work plan and workplace requirements
2 Apply environmental requirements	**2.1**	Environmental legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Environmental hazard control measures are monitored in accordance with workplace requirements
	2.3	Work permits/approvals are applied in accordance with workplace requirements
	2.4	Plant, materials, vehicles, tools, equipment and PPE are used in accordance with workplace requirements
	2.5	Environmental incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Work permits/approvals are finalised in accordance with workplace requirements
	3.3	Environmental incidents or unplanned events are reported in accordance with workplace requirements
	3.4	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.5	Plant, vehicles, tools, and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.6 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

3.7 Environmental work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL11 Apply sustainable energy and environmental procedures.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDREL001 Apply environmental requirements

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - environmental
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- applying and monitoring environmental requirements
- completing environmental risk assessment
- using plant, vehicles, materials, tools and equipment safely
- maintaining a safe and clean workplace environment
- organising and finalising relevant work permits/approvals in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - manufacturer and supplier information of hazardous substances/dangerous goods, including safety data sheets (SDS)
- hazards, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- application, purpose and types of work permits/approvals
- events constituting an unplanned event or incident

- procedures for responding to an unplanned event or incident
- employer and employee responsibilities
- source information on environmental issues and updates
- environmental impacts from work-related activities
- environmental terminology used in the electricity supply industry (ESI)
- workplace environmental management plan
- methods of cleaning mobile plant, equipment and tools
- safe use of plant, vehicles, materials, tools and equipment
- types and application of PPE used for hazardous substances and dangerous goods/materials
- procedures for handling plant, tools and equipment that contain hazardous substances
- procedures for handling, controlling, storing, recycling and disposing of:
  - hazardous substances
  - waste materials
- emergency procedures for spillages of hazardous substances to reduce risks to the environment, including:
  - methods of cleaning up excessive spillages
  - methods of protection to surrounding environment
  - procedures for notification of relevant personnel and authorities
  - procedures for reporting and recording incidents
- environmentally sensitive areas, including:
  - identification of
  - working in
  - procedures for entering and exiting
- fire precautions for field work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for applying environmental requirements
- applicable documentation, including workplace requirements, relevant industry standards,

equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDREL002 Comply with environmental requirements

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to comply with environmental requirements in the electricity supply industry (ESI).

It includes complying with and monitoring environmental requirements, risks and impacts. It also includes recording and reporting environmental incidents.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Not applicable.

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to comply with environmental requirements	**1.1** Environmental legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed

	1.2	Work plan is confirmed in accordance with workplace requirements
	1.3	Environmental hazards are identified, risks assessed and control measures identified and confirmed
	1.4	Work permits/approvals are received and confirmed in accordance with workplace requirements
	1.5	Plant, materials, vehicles, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.6	Worksite is prepared in accordance with the work plan and workplace requirements
2 Comply with environmental requirements	**2.1**	Environmental legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are complied with and monitored
	2.2	Environmental hazard control measures are monitored in accordance with workplace requirements
	2.3	Work permits/approvals are complied with in accordance with workplace requirements
	2.4	Plant, materials, vehicles, tools, equipment and PPE are used in accordance with workplace requirements
	2.5	Environmental incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Work permits/approvals are finalised in accordance with workplace requirements
	3.3	Environmental incidents or unplanned events are reported in accordance with workplace requirements
	3.4	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.5	Plant, vehicles, tools, and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.6 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

3.7 Environmental work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDREL002 Comply with environmental requirements

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- complying with relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - environmental
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- complying with and monitoring environmental requirements
- using plant, vehicles, materials, tools and equipment safely
- maintaining a safe and clean workplace environment
- dealing with an unplanned environmental event on at least one (1) occasion
- complying with unplanned environmental event reporting procedures
- receiving and finalising relevant work permits/approvals in accordance with workplace requirements
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - manufacturer and supplier information of hazardous substances/dangerous goods, including safety data sheets (SDS)
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- application, purpose and types of work permits/approvals
- events constituting an unplanned event or incident

- procedures for responding to an unplanned event or incident
- employer and employee responsibilities
- source information on environmental issues and updates
- environmental impacts from work-related activities
- environmental terminology used in the electricity supply industry (ESI)
- workplace environmental management plan
- methods of cleaning plant, equipment and tools
- safe use of plant, vehicles, materials, tools and equipment
- types and application of PPE used for hazardous substances and dangerous goods/materials
- procedures for handling plant, tools and equipment that contain hazardous substances
- procedures for handling, controlling, storing, recycling and disposing of:
  - hazardous substances
  - waste materials
- environmentally sensitive areas, including:
  - identification of
  - working in
  - procedures for entering and exiting
- emergency procedures for spillages of hazardous substances to reduce risks to the environment, including:
  - methods of cleaning up excessive spillages
  - methods of protection to surrounding environment
  - procedures for notification of relevant personnel and authorities
  - procedures for reporting and recording incidents
- fire precautions for field work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, equipment specifications,

regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDREL003 Identify and apply controls for alternate supplies on the distribution network

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to identify and apply controls for alternate supplies on the distribution network in the electricity supply industry (ESI).

It includes identifying potential alternate supplies and applying control measures while performing work on or near the de-energised distribution network.

It also includes monitoring control measures for the alternate supplies to manage two-way power flow.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS018 Perform low voltage field switching operation to a given schedule

Competency Field

Entry Level Cross Discipline

Unit Sector

Not Applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on the distribution network	**1.1** Legislation, regulations, standards, codes of practice and workplace requirements for the work to be performed are referred to and confirmed
	1.2 Alternate supplies are identified and control measures are applied in accordance with workplace requirements
	1.3 Hazards are identified, risks assessed and control measures identified and applied
	1.4 Work permits are organised in accordance with workplace requirements
	1.5 Tools, equipment and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.6 Worksite is prepared in accordance with workplace requirements
2 Carry out work on the distribution network	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied
	2.2 Work permits are received and signed in accordance with workplace requirements
	2.3 Control measures are monitored for alternative supplies in accordance with workplace requirements
	2.4 Manual handling, the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.5 Work is carried out on the distribution network in accordance with workplace requirements
	2.6 Incidents or unplanned events are responded to in

		accordance with workplace requirements
3 Complete work and documentation	**3.1**	Work is completed and control measures removed from the worksite in accordance with workplace requirements
	3.2	Work permits are signed off in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Incidents or unplanned events are reported in accordance with workplace requirements
	3.5	Tools and equipment are cleaned, checked and returned in accordance with workplace requirements
	3.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit. No Equivalent Unit.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDREL003 Identify and apply controls for alternate supplies on the distribution network

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- identifying potential alternate supplies
- identifying control measures to manage alternate supplies
- implementing at least two (2) of the following control measures for alternate supplies:
  - isolation points, including using tags and locks in accordance with workplace requirements
  - short circuiting and earthing
  - bonding
  - low voltage (LV) short circuited
- monitoring control measures for alternate supplies to manage two-way power flow
- dealing with an unplanned event on at least one (1) occasion
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including:

- potential hazards, including:
  - alternating current (a.c.) and direct current (d.c.)
  - installation multiple earthed neutral (MEN) location changes in stand-alone mode
  - residual charge in electronic devices, e.g., capacitors in inverters
  - potential rise and currents on neutral
- potential backfeed hazards from:
  - faulty equipment
  - incorrectly installed equipment
- types and application of PPE
- test equipment
- concept, application and operation of alternate supplies, including:
  - anti-islanding control and protection
  - system monitoring and load management
- identification of alternate supplies from:
  - signage
  - visual
  - registers
- alternate supplies, including:
  - photovoltaic (PV) systems
  - battery systems
- awareness of known and unknown alternate supplies, including:
  - generation sources
  - storage sources
- impacts of two-way power flow connected to the grid
- control measures for alternate supplies, including:
  - isolation points, including tags and locks, in accordance with workplace requirements
  - short circuiting and earthing
  - bonding
  - LV short circuited
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- procedures for workplace records, reports and documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, relevant industry standards, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to operate plant and equipment in the vicinity of live electrical apparatus in the electricity supply industry (ESI).

It includes operating plant and equipment safely up to the defined safe approach distance.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to operate plant and equipment	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed

	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Hazards are identified, risks assessed and control measures identified and applied
	1.4	Work permits are received and signed in accordance with workplace requirements
	1.5	Plant, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.6	Safe approach distances are determined and confirmed in accordance with workplace requirements
	1.7	Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.8	Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.9	Worksite is prepared in accordance with the work plan and workplace requirements
	1.10	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Operate plant and equipment	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Hazard control measures are monitored in accordance with workplace requirements
	2.3	Safety observer is positioned to observe the plant or equipment in accordance with workplace requirements
	2.4	Safe approach distances are maintained when operating plant and equipment in the vicinity of live electrical apparatus
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Plant and equipment are safely operated in the vicinity of live electrical apparatus in accordance with workplace

		requirements
	2.7	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Incidents or unplanned events are reported in accordance with workplace requirements
	3.2	Work permits are signed off in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- confirming safe approach distances
- operating equipment while maintaining the safe approach distance
- operating plant while maintaining the safe approach distance
- determining electricity network voltages, including:
  - low voltage (LV)
  - high voltages (HV)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards:

    - conductor movements - swing, sag or blow off
- types and application of PPE
- safe use of plant and equipment in the vicinity of live electrical apparatus
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
    - role and responsibilities
    - communication methods
- plant and equipment, including:
    - operating characteristics
    - terminology related to operating in the vicinity of live electrical apparatus
    - hazards and potential hazards
    - communication methods and barriers between plant/equipment operator and safety observer
- characteristics of overhead and underground electricity networks, including:
    - transmission, distribution and rail
    - layout/configuration
    - components
    - voltage levels.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for operating plant and equipment in the vicinity of live electrical apparatus
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDREL005 Work safely in the vicinity of live electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to work safely in the vicinity of live electrical apparatus in the electricity supply industry (ESI).

It includes working safely up to the defined personal safe approach distance in the vicinity of live electrical apparatus for ESI workers.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work safely in the vicinity of live	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to

electrical apparatus		be performed are referred to and confirmed
	1.2	Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.3	Hazards are identified, risks assessed and control measures identified and applied
	1.4	Work permits are received and signed in accordance with workplace requirements
	1.5	Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.6	Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.7	Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.8	Worksite is prepared in accordance with the work plan and workplace requirements
2 Work safely in the vicinity of live electrical apparatus	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools and equipment are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed in the vicinity of live electrical apparatus
	2.7	Incidents or unplanned events are responded to in

		accordance with workplace requirements
3 Complete work and documentation	**3.1**	Incidents or unplanned events are reported in accordance with workplace requirements
	3.2	Work permits are signed off in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL16 Working safely near live electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDREL005 Work safely in the vicinity of live electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- determining electricity network voltages, including:
  - low voltage (LV)
  - high voltages (HV):
    - distribution
    - sub-transmission
    - transmission
- identifying electricity network assets
- determining and confirming safe approach distances
- performing work while maintaining the personal safe approach distance
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:

- WHS/OHS
- safe approach distances
- emergency procedures
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods
- basic electrical principles, including:
  - voltage, current and resistance
  - typical effects of current, including physiological effects and induced voltages
  - consequences of short circuits, including arc flash and touch and step potentials
- electricity networks, including:
  - LV
  - HV:
    - distribution
    - sub-transmission
    - transmission
  - earthing systems
  - associated assets
  - layouts and configuration
  - basic protection
  - relationship between an overhead and underground supply system
- terminology related to working safely in the vicinity of live electrical apparatus.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for working safely near live electrical apparatus
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to work safely in the vicinity of live electrical apparatus as a non-electrical worker.

It includes compliance with safe approach distances for the worker, plant, tools and equipment.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Not applicable.

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work safely in the vicinity of live electrical apparatus	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed

	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4	Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5	Hazards are identified, risks assessed and control measures identified and applied
	1.6	Work permits are received and signed in accordance with workplace requirements
	1.7	Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.8	Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.9	Worksite is prepared in accordance with the work plan and workplace requirements
	1.10	Electricity infrastructure assets and associated voltages are identified and confirmed
	1.11	Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
2 Work safely in the vicinity of live electrical apparatus	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements

	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Incidents or unplanned events are reported in accordance with workplace requirements
	3.2	Work permits are signed off in accordance workplace requirements
	3.3	Works records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- confirming and maintaining the safe approach distance, including:
  - mobile plant, tools and equipment
  - personal
- determining electricity network voltages, including:
  - low voltage (LV)
  - high voltages (HV)
- identifying electricity network assets
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances

    - emergency procedures
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment, including:
    - earthing of mobile plant
- application, purpose and types of work permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
    - role and responsibilities
    - communication methods
- basic electrical principles, including:
    - voltage, current and resistance
    - typical effects of current, including physiological effects and induced voltages
    - consequences of short circuits, including arc flash and touch and step potentials
- electricity networks, including:
    - LV
    - HV
    - earthing systems
    - associated assets
    - asset identification
    - layouts and configuration
    - basic protection
    - relationship between an overhead and underground supply system
- terminology related to working safely in the vicinity of live electrical apparatus.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry

- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS001 Coordinate and direct power system switching schedules

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the coordination and direction of switching the high voltage (HV) and low voltage (LV) system. It includes coordinating switching between operating authorities and HV customers. It also includes the direction of switching on the HV and LV electrical network.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL005 Work safely in the vicinity of live electrical apparatus

Transmission Overhead Pathway Group

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS017 Perform high voltage field switching operation to a given schedule

UETDRTO006 Install and maintain transmission conductors

UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

UETDRDO005 Maintain overhead energised low voltage distribution network

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS008 Install and maintain electrical apparatus

UETDRIS010 Install and maintain low voltage overhead services

UETDRIS012 Install and maintain poles, structures and hardware

UETDRIS018 Perform low voltage field switching operation to a given schedule

Rail Traction Pathway Group

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT002 Install overhead traction components and equipment

UETDRRT003 Install rail traction bonds

UETDRRT004 Install traction overhead wiring systems

UETDRRT009 Maintain overhead traction components and equipment

UETDRRT011 Maintain traction overhead wiring systems

UETDRRT013 Perform rail traction switching operations to a given schedule

Distribution Cable Jointing Pathway Group

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

UETDRDU016 Lay power cables

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS008 Install and maintain electrical apparatus

UETDRIS011 Install and maintain low voltage underground services

UETDRIS018 Perform low voltage field switching operation to a given schedule

Electrical Pathway Group

UEENEEE137A Document and apply measures to control OHS risks associated with

electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETDRSB001 Perform substation switching operations to a given schedule

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to coordinate and direct switching schedules	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule

	1.4	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
2 Carry out coordinate and direct switching schedules	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls

		encountered in the work schedule according to requirements and/or established procedures
	2.6	Coordination and direction of switching schedules are carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe coordination and direction of switching schedules to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete coordinate and direct switching schedules	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Relevant work permits are signed off and electrical plant is returned to service and client/customer advised in accordance with requirements
	3.4	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS51 Coordinate and direct power system switching schedules.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS001 Coordinate and direct power system switching schedules

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- obtaining all the following:
  - approvals/clearances
  - access permits
- demonstrating all of the following:
  - switching direction
  - switching coordination
  - autonomy of working with network control
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical equipment fundamentals used in the powerline industry encompassing:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment - high voltage (HV) and low voltage (LV) equipment
  - characteristics, capabilities and application of powerline electrical equipment
  - safety precautions with regards to using electrical equipment
  - techniques in pre-use inspection on the serviceability of electrical equipment
  - techniques in the general maintenance, care and storage of electrical equipment
  - identifying hazards, and assessing and controlling risks associated with the use of electrical equipment
- installation of switchgear and associated equipment encompassing:

- types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types of switchgear, installation procedures, earthing, and requirements and techniques
- types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and/or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques, and pole mounted locations
- maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry (ESI) standards and procedures
- testing and commissioning - ESI standards and procedures

- LV switching principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed
  - LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permits, operational procedures and earthing procedures
  - personnel protective equipment (PPE) for LV switching
- HV switching principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and network interconnectors source of possible back-feed
  - role of the HV switching operator
  - operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits; purpose and procedures for operational forms, access authorities and permits
  - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - types and categories of HV switchgear
  - application, function and operating capabilities of switchgear
  - restrictions pertaining to HV switching equipment
  - procedures for the isolation of HV transmission main and working earths
  - earthing HV electrical apparatus practices and procedures for access - purposes of "operational" and additional work part "on-site" earths, factors determining the location and effectiveness of operational earthing, acceptable industry procedures, PPE and HV switching techniques

    - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- HV distribution transformer principles encompassing:
    - operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer - cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults
    - HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers
- HV single wire earth return (SWER) system encompassing:
    - application and function of SWER system components
    - circuit arrangement
    - principle of operation
    - hazards and procedures associated with faulty SWER earth systems
    - procedure to isolate, energise and commission SWER substations
- feeder automation system encompassing:
    - function of feeder automation system and the main components
    - operation procedure for a remote field device from a local control station
    - functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
    - SCADA system security interlocks and access restrictions
    - SCADA system operation when switching apparatus or retrieving data via a remote access device, such as remote access terminal (RAT), dial up voice annunciated system and local control station
    - function of the main components of a local/remote control system
    - operation of a field devices using SCADA systems via a RAT, dial up voice annunciated system and local control station
- HV system switching principles, including switching authorisation procedures, encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings
    - types and characteristics of HV systems and equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances (SAD), responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations

    - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, emergency fault procedures and energisation procedures
- LV system switching principles, including switching authorisation procedures, encompassing:
    - legislation, standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings
    - types and characteristics of LV systems and equipment to be switched
    - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distance, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- coordinating and directing switching instructions encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
    - specific enterprise processes, policies and procedures to be followed
    - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
    - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
    - techniques in the effective utilisation of available resources
    - techniques in the coordination and directing of switching schedules instructions
    - relationship between the operating authorities and HV customers and operating agreements
    - techniques in coordinating and directing HV and LV switching of electrical networks
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
    - responsibilities of the switching operator
    - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
    - techniques in gathering, collating and confirming data on switching procedures
- HV overhead and substation switching principles encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to HV overhead and substation switching
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment

- role and responsibilities of the HV switching operator
- operational forms, access authorities and permits and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits and hazard/risk assessments; purpose and procedure for operational forms, access authorities and hazard/risk assessments
- use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
- HV switchgear – types, categories, application and operating capabilities
- operation of HV overhead switching or indicating devices - fuses, disconnect fuses, load switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, air-breaks switches, disconnects, live line clamps, phasing sticks and phasing tester
- operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications
- restrictions pertaining to HV switching equipment
- procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing, and HV switching techniques
- operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

- LV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to LV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
  - operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments; purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, air-break switches, disconnects, live line clamps, phasing sticks and phasing tester
  - operation of protection systems and substation equipment - fault levels and settings; types and applications, protection systems and substation equipment fault levels and settings; types and applications
  - restrictions pertaining to LV switching equipment
  - procedures for the isolation of LV distributions main and working earths
  - earthing LV electrical apparatus practices and procedures for access authority issuing

- LV switching techniques
- operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; points of isolation and earthing locations (safety and working earths); and responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- preparation of a LV switching instruction encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; isolation points and earthing; and responsibilities of the switching operator
  - techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader

programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawings and documents encompassing:
    - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
    - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
    - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings encompassing:
    - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS002 Coordinate power system permit procedures

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the coordination of work procedures that require the issue of electrical permits to work and other permits for working on major parts of the electrical network. It encompasses the analysis and coordination of all work activities planned to be undertaken within more or less the same time timeframe to ensure that the organisation's work safety and statutory requirements are complied with; the extent of power interruption, and hence inconvenience to customers, is minimised; and the effective utilisation of available resources, both from the organisation and from its contractors to ensure all planned activities are completed in a timely manner to specified standards and requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL005 Work safely in the vicinity of live electrical apparatus

Transmission Overhead Pathway Group

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
UETDRIS007 Install and maintain distribution overhead conductors and cables
UETDRIS017 Perform high voltage field switching operation to a given schedule
UETDRTO006 Install and maintain transmission conductors
UETDRTO007 Install and maintain transmission structures and hardware
Distribution Overhead Pathway Group
UETDRDO005 Maintain overhead energised low voltage distribution network
UETDREL001 Apply environmental requirements
UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
UETDRIS007 Install and maintain distribution overhead conductors and cables
UETDRIS008 Install and maintain electrical apparatus
UETDRIS010 Install and maintain low voltage overhead services
UETDRIS012 Install and maintain poles, structures and hardware
UETDRIS018 Perform low voltage field switching operation to a given schedule
Rail Traction Pathway Group
UETDREL001 Apply environmental requirements
UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
UETDRIS007 Install and maintain distribution overhead conductors and cables
UETDRIS012 Install and maintain poles, structures and hardware
UETDRRT002 Install overhead traction components and equipment
UETDRRT003 Install rail traction bonds
UETDRRT004 Install traction overhead wiring systems
UETDRRT009 Maintain overhead traction components and equipment
UETDRRT011 Maintain traction overhead wiring systems
UETDRRT013 Perform rail traction switching operations to a given schedule
Distribution Cable Jointing Pathway Group
UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable
UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable
UETDRDU016 Lay power cables
UETDREL001 Apply environmental requirements
UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus
UETDRIS008 Install and maintain electrical apparatus
UETDRIS011 Install and maintain low voltage underground services

UETDRIS018 Perform low voltage field switching operation to a given schedule

Electrical Pathway Group

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETDRSB001 Perform substation switching operations to a given schedule

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to coordinate permit procedures	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures

	1.3	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.4	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.5	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.6	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and applied in the coordination of permit procedures according to established procedures
	1.7	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.8	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
2 Carry out the coordination of permit procedures	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.3	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.4	Coordination of permit procedures is carried out in accordance with the work schedule and requirements and/or established procedures

	2.5	Essential knowledge and associated skills are applied in the safe coordination of permit procedures to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.6	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.7	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard
3 Complete the coordination of permit procedures	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Relevant work permits are signed off and plant is returned to service and client/customer advised in accordance with requirements
	3.3	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.4	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS50 Coordinate power system permit procedures.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS002 Coordinate power system permit procedures

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing all the following:
  - developing a permit schedule and/or permit issuing procedures
  - facilitating and coordinating the delivery and issuing of permits
- gathering, collating and confirming data on different worksites relevant to:
  - electrical network diagrams for the specific worksite
  - earth permits
  - safe working area
  - work to be carried out in confined space or in hazardous environment
  - specific outsourcing procedures
  - specific hazard identification
  - risk classification and management procedures
  - regulatory requirements, such as WHS/OHS and electrical safety
- completing all the following:
  - receiving and coordinating the cancellation of permits in readiness for restoration
  - conducting audits permit correctness procedures
- conducting at least two (2) of the following:
  - issuing other work permits, such as working in confined space, as required
  - coordinating permits
  - engaging and briefing contractors on electrical and other work permits
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

the requirements of the elements and performance criteria and include knowledge of:

- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements, such as WHS/OHS and electrical safety
  - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits - working in confined space, as required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- high voltage (HV) switching principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and network interconnectors source of possible back-feed
  - role of the HV switching operator
  - operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, and purpose and procedures for operational forms, access authorities and permits
  - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - types and categories of HV switchgear
  - application, function and operating capabilities of switchgear
  - restrictions pertaining to HV switching equipment
  - procedures for the isolation of HV transmission main and working earths
  - earthing HV electrical apparatus practices and procedures for access - purposes of "operational" and additional work part "on-site" earths, factors determining the location

and effectiveness of operational earthing, acceptable industry procedures, personal protective equipment (PPE) and HV switching techniques
    - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- HV distribution transformer principles encompassing:
    - operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms; operating limitations and the relationship between transformer and HV fuse rating; purpose and principle operation of HV distribution transformer tap changers; HV distribution transformer and transformer - cable combination switching practices; paralleling requirements, isolation and earthing procedures for access; common distribution transformer and associated electrical apparatus faults
    - HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers
- HV single wire earth return (SWER) system encompassing:
    - application and function of SWER system components
    - circuit arrangement
    - principle of operation
    - hazards and procedures associated with faulty SWER earth systems
    - procedure to isolate, energise and commission SWER substations
- feeder automation system encompassing:
    - function of feeder automation system and the main components
    - operation procedure for a remote field device from a local control station
    - functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
    - SCADA system security interlocks and access restrictions
    - SCADA system operation when switching apparatus or retrieving data via a remote access device, such as remote access terminal (RAT), dial up voice annunciated system and local control station
    - function of the main components of a local/remote control system
    - operation of a field devices using SCADA systems via a AT, dial up voice annunciated system and local control station
- HV system switching principles, including switching authorisation procedures, encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings
    - types and characteristics of HV systems and equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances (SAD), responsibilities and protocols, identifying switching

resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, emergency fault procedures and energisation procedures
- LV system switching principles, including switching authorisation procedures, encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings
    - types and characteristics of LV systems and equipment to be switched
    - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, SAD, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- HV overhead and substation switching principles encompassing:
    - legislation, standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to HV overhead and substation switching
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
    - role and responsibilities of the HV switching operator
    - operational forms, access authorities and permits and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits and hazard/risk assessments; purpose and procedures for operational forms, access authorities and hazard/risk assessments
    - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
    - HV switchgear – types, categories, application and operating capabilities
    - operation of HV overhead switching or indicating devices - fuses, disconnect fuses, load switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, air-breaks switches, disconnects, live line clamps, phasing sticks and phasing tester
    - operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications
    - restrictions pertaining to HV switching equipment
    - procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing and HV switching techniques
    - operate switching apparatus - identifying hazards, assessing and controlling risks

associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

- LV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to low voltage overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
  - operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedures for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, air-break switches, disconnects, live line clamps, phasing sticks and phasing tester
  - operation of protection systems and substation equipment - fault levels and settings; types and applications, protection systems and substation equipment fault levels and settings; types and applications
  - restrictions pertaining to LV switching equipment
  - procedures for the isolation of LV distributions main and working earths
  - earthing LV electrical apparatus practices and procedures for access authority issuing
  - LV switching techniques
  - operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; points of isolation and earthing locations (safety and working earths) and responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- preparation of a LV switching instruction encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; isolation points and earthing; and responsibilities of the switching operator

    - techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures
    - rules and regulations
    - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
    - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
    - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
    - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
    - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
    - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
    - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
    - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records and first aid/medical records
- enterprise-specific technical drawings and documents encompassing:
    - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
    - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
    - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings encompassing:
    - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instruction/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution

system symbols and feeder plans, and processes of updating switching diagrams.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS003 Develop high voltage switching schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the preparation of a basic switching schedule for interconnected high voltage (HV) network plant. It includes planning basic outages and taking into account loading of network components. It also includes the calculation of network loading conditions to ensure the network is operating within designed parameters.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS017 Perform high voltage field switching operation to a given schedule

Transmission Overhead Pathway Group

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRTO006 Install and maintain transmission conductors

UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

UETDRDO005 Maintain overhead energised low voltage distribution network

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS008 Install and maintain electrical apparatus

UETDRIS010 Install and maintain low voltage overhead services

UETDRIS012 Install and maintain poles, structures and hardware

Rail Traction Pathway Group

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT002 Install overhead traction components and equipment

UETDRRT003 Install rail traction bonds

UETDRRT004 Install traction overhead wiring systems

UETDRRT009 Maintain overhead traction components and equipment

UETDRRT011 Maintain traction overhead wiring systems

Distribution Cable Jointing Pathway Group

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

UETDRDU016 Lay power cables

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS008 Install and maintain electrical apparatus

UETDRIS011 Install and maintain low voltage underground services

Electrical Pathway Group

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to develop HV switching schedules	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented

		and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE) required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
	1.10	Liaison and communication issues with other/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
2 Carry out the development of HV switching schedules	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks reported to immediate authorised personnel for directions according to established procedures
	2.3	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.4	Development of HV switching schedules is carried out in accordance with the work schedule and requirements and/or established procedures
	2.5	Essential knowledge and associated skills are applied in the safe development of HV switching schedules to ensure completion in an agreed timeframe and to quality

		standards with a minimum of waste according to requirements
	2.6	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.7	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete development of HV switching schedules	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Relevant work permits are signed off and plant is returned to service and client/customer advised in accordance with requirements
	3.4	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS48 Develop high voltage switching schedule.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS003 Develop high voltage switching schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- obtaining all the following:
  - approvals/clearances
  - access authorities
- completing at least one (1) of the following:
  - development of an interconnected switching schedule
  - development of a radial switching schedule
- completing all of the following:
  - planning of loading of network components, including standby generation
  - evaluating load parameters and effects on system, including paralleling and off-loading
  - identifying unexpected sources of energisation, e.g., generators and uninterruptible power supply (UPS)
  - implementing earthing procedures to reduce induced voltages
  - authorising issuance of work permits
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical equipment fundamentals used in the powerline industry encompassing:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment - high voltage (HV) and low voltage (LV) equipment
  - characteristics, capabilities and application of powerline electrical equipment

  - safety precautions with regards to using electrical equipment
  - techniques in pre-use inspection on the serviceability of electrical equipment
  - techniques in the general maintenance, care and storage of electrical equipment
  - identifying hazards, assessing and controlling risks associated with the use of electrical equipment
- HV switching principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and network interconnectors source of possible back-feed
  - role of the HV switching operator
  - operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits; purpose and procedure for operational forms, access authorities and permits
  - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - types and categories of HV switchgear
  - application, function and operating capabilities of switchgear
  - restrictions pertaining to HV switching equipment
  - procedures for the isolation of HV transmission main and working earths
  - earthing HV electrical apparatus practices and procedures for access - purposes of operational and additional work part on-site earths, factors determining the location and effectiveness of operational earthing, acceptable industry procedures, personal protective equipment (PPE) and HV switching techniques
  - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- HV distribution transformer principles encompassing:
  - operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer - cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults
  - HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers
- HV single wire earth return (SWER) system encompassing:
  - application and function of SWER system components
  - circuit arrangement

  - principle of operation
  - hazards and procedures associated with faulty SWER earth systems
  - procedures to isolate, energise and commission SWER substations
- feeder automation system encompassing:
  - function of feeder automation system and the main components
  - operation procedure for a remote field device from a local control station
  - functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
  - SCADA system security interlocks and access restrictions
  - SCADA system operation when switching apparatus or retrieving data via a remote access device, such as remote access terminal (RAT), dial up voice annunciated system and local control station
  - function of the main components of a local/remote control system
  - operation of a field devices using SCADA systems via a RAT, dial up voice annunciated system and local control station
- HV system switching principles, including switching authorisation procedures, encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
  - requirements for the use of manuals, system diagrams/plans and drawings
  - types and characteristics of HV systems and equipment to be switched
  - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, emergency fault procedures and energisation procedures
- HV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to HV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the HV switching operator
  - operational forms, access authorities and permits, and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits, hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - HV switchgear – types, categories, application and operating capabilities

- operation of HV overhead switching or indicating devices - fuses, disconnect fuses, load switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, air-breaks, switches, disconnects, live line clamps, phasing sticks and phasing tester
- operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications
- restrictions pertaining to HV switching equipment
- procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; and HV switching techniques
- operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, points of isolation and earthing locations (safety and working earths), and responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or

equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawings and documents encompassing:
    - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
    - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
    - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings encompassing:
    - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS004 Develop low voltage switching schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the preparation of a basic switching schedule for low voltage (LV) network. It includes planning basic outages and taking into account loading of network components. It also includes the calculation of network loading conditions to ensure the network is operating within design parameters.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS018 Perform low voltage field switching operation to a given schedule

Transmission Overhead Pathway Group

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRTO006 Install and maintain transmission conductors

UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

UETDRDO005 Maintain overhead energised low voltage distribution network

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS008 Install and maintain electrical apparatus

UETDRIS010 Install and maintain low voltage overhead services

UETDRIS012 Install and maintain poles, structures and hardware

Rail Traction Pathway Group

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT002 Install overhead traction components and equipment

UETDRRT003 Install rail traction bonds

UETDRRT004 Install traction overhead wiring systems

UETDRRT009 Maintain overhead traction components and equipment

UETDRRT011 Maintain traction overhead wiring systems

Distribution Cable Jointing Pathway Group

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

UETDRDU016 Lay power cables

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS008 Install and maintain electrical apparatus

UETDRIS011 Install and maintain low voltage underground services

Electrical Pathway Group

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to develop LV switching schedules	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.4 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures

	1.5	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.6	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.7	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.8	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
2 Carry out the development of LV switching schedules	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.3	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.4	Development of LV switching schedules is carried out in accordance with the work schedule and requirements and/or established procedures
	2.5	Essential knowledge and associated skills are applied in the safe development of LV switching schedules to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements

	2.6	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.7	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete development of LV switching schedules	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Relevant work permits) are signed off and plant is returned to service and client/customer advised in accordance with requirements
	3.3	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.4	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS49 Develop low voltage switching schedule.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS004 Develop low voltage switching schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- obtaining all the following:
  - approvals/clearances
  - access authorities
- completing the following:
  - development of low voltage (LV) switching schedule to enterprise requirements
- completing all the following:
  - planning of loading of network components, including standby generation
  - evaluating load parameters and effects on system, including paralleling and off-loading
  - identifying unexpected sources of energisation, e.g., generators, uninterruptible power supply (UPS) and solar
  - implementing earthing procedures to reduce induced voltages
  - authorising issuance of work-permits
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical equipment fundamentals used in the powerline industry encompassing:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment - high voltage (HV) and LV equipment
  - characteristics, capabilities and application of powerline electrical equipment
  - safety precautions with regards to using electrical equipment

  - techniques in pre-use inspection on the serviceability of electrical equipment
  - techniques in the general maintenance, care and storage of electrical equipment
  - identifying hazards, and assessing and controlling risks associated with the use of electrical equipment
- installation of switchgear and associated equipment encompassing:
  - types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types of switchgear, installation procedures, earthing requirements and techniques
  - types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
  - installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and/or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques, and pole mounted locations
  - maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry (ESI) standards and procedures
  - testing and commissioning - ESI standards and procedures
- LV switching principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed
  - LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures and earthing procedures
  - personnel protective equipment (PPE) for LV switching
- LV system switching principles, including switching authorisation procedures, encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
  - requirements for the use of manuals, system diagrams/plans and drawings
  - types and characteristics of LV systems and equipment to be switched
  - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- LV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements

applicable to LV overhead and substation switching
- requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
- operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments; purpose and procedure for operational forms, access authorities and hazard/risk assessments
- use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
- LV switchgear – types, categories, application and operating capabilities
- operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, air-break switches, disconnects, live line clamps, phasing sticks and phasing tester
- operation of protection systems and substation equipment - fault levels and settings; types and applications, protection systems and substation equipment fault levels and settings; types and applications
- restrictions pertaining to LV switching equipment
- procedures for the isolation of LV distributions main and working earths
- earthing LV electrical apparatus practices and procedures for access authority issuing
- LV switching techniques
- operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

- preparation of a LV switching instruction encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; isolation points and earthing; and responsibilities of the switching operator
  - techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue

management, and training and competency development - understanding and promotion

- enterprise-specific WHS/OHS instructions encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawings and documents encompassing:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to implement and monitor the power system environmental and sustainable energy management policies and procedures in the electricity supply industry (ESI).

It includes collecting, interpreting and applying environmental management information, identifying environmental impacts, assessing risks and establishing best practice procedures for implementation of management plans to ensure compliance. It also includes monitoring policies and plans and developing modifications as part of the review process.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Electrotechnology Pathway Unit Group

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

ESI - TDR Pathway Unit Group

UETDREL001 Apply environmental requirements

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to implement and monitor environmental and sustainable energy management policies and procedures	**1.1** Work schedules, plans, drawings, workplace procedures and material lists are received and confirmed
	1.2 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.3 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.4 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.5 Relevant work permits are obtained, understood and signed onto in accordance with workplace procedures
	1.6 Plant, equipment, tools and personal protective equipment required for work is identified, obtained and confirmed in working order
	1.7 Liaison and communication issues with authorised personnel, authorities, clients and landowners are resolved to perform work, as required
	1.8 Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9 Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.10 Traffic management is planned and implemented in accordance with workplace procedures
2 Carry out the implementation and monitoring of	**2.1** WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with

environmental and sustainable energy management policies and procedures		workplace procedures
	2.2	First aid, pole top rescue and other related work procedures are performed in accordance with job requirements and/or workplace procedures
	2.3	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks and risk control measures are implemented, preventative action taken and monitored and/or appropriate authorities consulted, where necessary, in accordance with requirements and workplace procedures
	2.5	Remedial actions are taken to overcome shortfalls encountered in the work schedule in accordance with job requirements and workplace procedures
	2.6	Environmental and sustainable energy management policies and procedures are implemented and monitored in accordance with work schedules, job requirements and workplace procedures
	2.7	Environmental and sustainable energy management policies and procedures are implemented and monitored to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.8	Solutions to non-routine problems are identified and actioned in accordance with workplace procedures
	2.9	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the implementation and monitoring of environmental and sustainable energy management policies and procedures	**3.1**	Work is checked against work schedule for conformance with job requirements, anomalies reported and solutions identified in accordance with workplace procedures

3.2 Accidents, incidents and/or injuries are reported in accordance with requirements and workplace procedures

3.3 Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures

3.4 Tools, equipment and surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures

3.5 Relevant work permit/s are signed off, work completed/returned to service and client/customer advised in accordance with job requirements

3.6 Work completion records, reports and information are confirmed, processed and relevant person/s notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS63 Implement and monitor the power system environmental and sustainable energy management policies and procedures.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- gathering environmental management information
- implementing and monitoring environmental and sustainable energy policies and plans
- identifying environmental impacts and assess risks
- implementing and monitoring the procedures for quantifying environmental impacts and controlling risks
- implementing and monitoring procedures for dealing with environmental incidents
- maintaining environmental records, reports and plans
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- environmental fundamentals, including:
  - environmental standards, codes, environmental legislation, supply authority regulations and/or enterprise requirements applicable to the control of environment associated with the worksite - relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi government policies and regulations, and relevant community planning and development agreements (including land care agreements)
  - employer and employee responsibilities
  - methods of obtaining information on environmental issues and updates
  - methods of identifying environmental impacts from work-related activities
  - meaning of environmental terms - identification, assessment and control of risks,

compliance, best practice and sustainable energy
    - procedures for implementing management plans to ensure compliance
- implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment, including:
    - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission - Commonwealth/state/territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
    - identification, assessment, control and monitoring of the hazards to the environment associated with the powerline industry
    - workplace environment quality standards enterprise plan - setting of acceptable emission level limits from power plant equipment; impact of the enterprise activities on air, water quality and nature; impact and level of emissions from power plant, power distribution and transmission equipment; and network infrastructure (noise generation, noxious gas emissions, greenhouse gas production, electromagnetic emissions, electromagnetic field strength, oil leakage and insulation breakdown products)
    - provision of manufacturer and supplier information, such as material safety data sheets (MSDS)
    - gathering of environment management information
    - maintenance of environmental records
    - risk assessment and its management in powerline industry
    - maintenance strategies for environment protection programs - developing processes for promoting, maintaining and improving environmental impact in the workplace; identifying techniques for evaluating and reviewing environment protection education and training programs; elements of an effective environment protection management system; and Environment Protection Authority (EPA) consultation and accident/incident investigations
- implementation and monitoring requirements for the management of sustainable energy in powerline installations and operation of plant and equipment, including:
    - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of sustainable energy principles in the workplace, and power distribution and transmission networks - Commonwealth/state/territory legislation, legislation relevant to the workplace, Environment Protection Act legislation, local government by-laws, community planning and development agreements (i.e., land care agreements)
    - monitoring and reporting procedures for enterprise-specific policy implementation on sustainable energy issues, including the gathering of energy consumption and loss information
    - ongoing development of energy conservation policies - procedures for quantifying energy usage and wastage, energy usage auditing procedures, planning of energy conservation methods, and monitoring and review processes
    - resource availability planning for policy implementation
    - techniques in managing documentation - information on applicable sustainable energy

laws or other requirements; complaint records; training records; process information; process operational logbooks; inspection, maintenance and calibration records; relevant contractor and supplier information; incident reports; and information on emergency preparedness and response

- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as MSDS; registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise policies and procedures in maintaining the operation of plant, equipment and powerline installations using sustainable energy principles, including:
  - overview of sustainable energy technologies – solar, wind, biomass and CO2 generation
  - economic benefits of sustainable energy initiatives

- relationship between greenhouse effect and sustainable energy
- types of renewable energy technology suitable for use in Australia - photovoltaic (PV), solar thermal, wind energy conversion, biomass, wind/tidal and gas thermal
- relationship between safe building design and energy efficiency - building aspect, insulation, ventilation, glazing, passive solar design and shading
- techniques in selecting control devices
- components within a lighting system
- energy efficient lighting products, design and installation
- use of natural light
- automated lighting control systems
- assessment of requirements and selection of system
- techniques in selecting control devices
- components within a heating, ventilation and air conditioning (HVAC) and refrigeration control system
- energy efficient refrigerants
- detection systems to control air flow
- energy star ratings for coefficient of performance
- energy control systems
- advantages of evaporative air conditioners in dry climates
- assessment of requirements and selection of system.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to implement and monitor the power system environmental and sustainable energy management policies and procedures in the electricity supply industry (ESI).

It includes collecting, interpreting and applying environmental management information, identifying environmental impacts, assessing risks and establishing best practice procedures for implementation of management plans to ensure compliance. It also includes monitoring policies and plans and developing modifications as part of the review process.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to implement and monitor organisational WHS/OHS policies, procedures and programs	**1.1** Relevant workplace documentation is identified, analysed and work preparation required for planning and coordination determined
	1.2 Relevant requirements and workplace procedures are communicated to all personnel and identified for all worksites
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures are prioritised, implemented and monitored to ensure work safe systems are followed in accordance with workplace procedures
	1.4 Work is prioritised and sequenced for efficient and effective outcome following consultation with relevant personnel for completion within agreed timeframes, to standard and in accordance with workplace procedures
	1.5 Risk control measures are identified, prioritised, implemented and evaluated in accordance with work schedule
	1.6 Relevant work permits are confirmed and signed in accordance with requirements and/or workplace procedures
	1.7 Resources, personnel, equipment, tools and personal protective equipment (PPE) required for the job are identified, scheduled, coordinated and confirmed in safe and technical working order
	1.8 Potential issues in communicating with relevant person/s, authorities, clients and landowners are identified, resolved and work activities planned and coordinated
	1.9 Worksite is prepared in accordance with the work schedule to minimise WHS/OHS risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.10 Personnel and contractors participating in work are fully briefed and responsibilities authorised and coordinated in accordance with workplace procedures

	1.11	Traffic management plan is confirmed as being applied in accordance with workplace procedure
2 Carry out the implementation and monitoring of organisational WHS/OHS policies, procedures and programs	**2.1**	WHS/OHS and sustainable energy principles and practices are implemented and monitored to reduce workplace incidents and minimise waste in accordance with job requirements and workplace procedures
	2.2	Relevant worksite personnel are confirmed current in first aid and rescue-related work in accordance with job requirements and workplace procedures
	2.3	Lifting, climbing, working in confined spaces, working at heights, using power tools and equipment techniques and practices are followed safely in accordance with requirements and workplace procedures
	2.4	Hazard warnings and safety signs are recognised, hazards assessed, WHS/OHS risk control measures implemented and monitored and/or appropriate authorities consulted, as required, in accordance with requirements and workplace procedures
	2.5	Remedial actions are taken to overcome shortfalls encountered in the work schedule in accordance with job requirements and workplace procedures
	2.6	Participative arrangements for the systematic management of WHS/OHS policies, procedures, programs and issues are implemented and monitored in accordance with work schedule, job requirements and workplace procedures
	2.7	Participative arrangements for the systematic management of WHS/OHS policies, procedures, programs and issues are implemented and monitored to ensure completion in agreed timeframe, to quality standards with a minimum of waste in accordance with job requirements
	2.8	Solutions to non-routine problems are identified and applied in accordance with requirements
	2.9	Quality of work checks are undertaken in accordance with job requirements and workplace procedures and to a community/industry standard

3 Complete implementation and monitoring of organisational WHS/OHS policies, procedures and programs	**3.1**	Work is checked against work schedule for conformance with job requirements, anomalies reported and solutions identified in accordance with workplace procedures
	3.2	Accidents, incidents and/or injuries are reported in accordance with requirements and workplace procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment and surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant work permit/s are signed off, work completed/returned to service and client/customer advised in accordance with job requirements
	3.6	Work completion records, reports and information are confirmed, processed and relevant person/s notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS62 Implement and monitor the power system organisational WHS OHS policies, procedures and programs.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- implementing and monitoring the power system organisational WHS/OHS policies, procedures and programs using all of the following:
  - relevant WHS/OHS Acts
  - regulations
  - codes of practice
- demonstrating all of the following:
  - application of organisation management systems and procedures to WHS/OHS
  - organisation's procedures for maintaining WHS/OHS records
- performing all of the following applications of risk management procedures:
  - undertake hazard identification
  - risk assessment and risk control in accordance with the hierarchy of control
  - application of the characteristics of the workforce impacting on the management of WHS/OHS
- demonstrating all of the following implementation and monitoring procedures:
  - provision of relevant information to the workgroup about WHS/OHS and the organisation's WHS/OHS policies, procedures and programs
  - participative arrangements for the management of WHS/OHS
  - organisation's procedures for identifying hazards and assessing risks
  - organisation's procedures for controlling risks
  - organisation's procedures for dealing with hazardous events
  - organisation's procedure for providing WHS/OHS training
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working practices and procedures for the installation of overhead distribution conductors, including:
  - limits of approach for personnel, vehicles, mobile plant and elevated work platforms (EWP)
  - requirements of persons prior to making bare hand contact with dead low voltage (LV) mains and apparatus
  - requirements of relevant electrical access permits necessary to allow work to be performed on LV and high voltage (HV) apparatus
  - safe working practices - requirements to enable safe working on conductive poles, procedure to attach an on-site earthing device to de-energised LV and HV overhead circuit
- powerline safety practices, including:
  - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel; and the types of protective apparatus and apparel used for the line worker
  - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes; and the safety issues relating to clearances from overhead conductors
  - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles; including personal fall protection, prevention and related requirements; and the practical procedures of climbing an overhead structure and fitting a pole chair
  - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, procedures used to provide an effective traffic management scheme and the use of a two-way radio
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; general fire prevention methods; and the precautions for personal protection when fighting small fires
  - rescue victims from heights and confined spaces - planning and identifying procedures; establishing responses; developing techniques; involvement of external emergency services; and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
  - requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work
- implementation and monitoring requirements for powerline safety, including:
  - identification of relevant legislation, codes and government guidelines for the

implementation and monitoring of WHS/OHS in the workplace - Commonwealth/state/territory legislation relevant to the workplace and the meaning of general duty of care under WHS/OHS legislation and common law

- workplace WHS/OHS enterprise plan - responsibilities of each member of the work team, review process for changing/improving WHS/OHS safety plan, and standing instructions for the systematic management of WHS/OHS in the workplace
- relationship between the WHS/OHS committee and employees - methods used to collate and distribute/disseminate WHS/OHS information; staff development activities and legislation requirements with regards to WHS/OHS training; methods of addressing barriers, such as literacy and cultural differences; and provisions relating to WHS/OHS issue resolution
- hazards associated with powerline industry - identification of hazards in the workplace, processes used and contributing factors to a hazardous situation, assessment of risks and control of WHS/OHS risks (risk management), the hierarchy of control and monitoring of risk control measures
- risk assessment and its management in powerline industry - principles and purposes of risk management; processes for conducting risk assessment, including, risk analysis and risk evaluation activities for selecting and implementing appropriate options for eliminating or minimising risk
- maintenance strategies for WHS/OHS programs - developing processes for promoting, maintaining and improving WHS/OHS in the workplace; identifying techniques for evaluating and reviewing WHS/OHS education and training programs; elements of an effective WHS/OHS management system; and WHS/OHS consultation and accident/incident investigations

- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations, induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, complaint and issues procedures
  - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprises-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol

- WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
- WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records, manufacturer and supplier information, such as material safety data sheets (MSDS); registers, maintenance reports; workers compensation and rehabilitation records; and first aid/medical records

- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS007 Install and maintain distribution overhead conductors and cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain distribution overhead conductors and cables used on poles and structures in the electricity supply industry (ESI).

It includes stringing, tensioning, terminating and securing conductors and cables to insulators or supports and carrying out electrical connections.

It also includes the repairing or replacement of conductors and cables, testing and updating system data/maintenance records.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS012 Install and maintain poles, structures and hardware

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain overhead conductors and cables	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.7 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.8 Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.9 Work permits are received and signed in accordance with workplace requirements
	1.10 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.11 Worksite is prepared in accordance with the work plan and workplace requirements
	1.12 Traffic management plans are confirmed as being in place in accordance with workplace requirements
2 Carry out installation and	**2.1** Legislation, regulations, standards, codes of practice and

maintenance of overhead conductors and cables		organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, climbing, working at heights and use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Overhead conductors and cables are strung, tensioned, terminated and secured in accordance with the work plan and workplace requirements
	2.8	Overhead conductor and cable electrical connections are completed in accordance with the work plan and workplace requirements
	2.9	Repair or replacement of overhead conductors and cables is completed in accordance with the work plan and workplace requirements
	2.10	Anti-vibration devices or spreaders are installed in accordance with the work plan and workplace requirements
	2.11	Conductors and cables are tested in accordance with the work plan and workplace requirements
	2.12	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.13	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements

3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements

3.4 Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

3.6 Work permits are signed off in accordance with workplace requirements

3.7 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS007 Install and maintain distribution overhead conductors and cables

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- installing at least two (2) types of overhead conductors/cables
- connecting and terminating conductors and cables in accordance with workplace requirements
- repairing overhead conductors/cables using at least two (2) of the following:
  - compression sleeves
  - splice
  - bullets
  - mid span joint
  - armour rods
- terminating conductors and cables
- connecting conductors and cables
- using at least two (2) types of height access methods
- using at least one (1) of the following types of stringing methods:
  - layout
  - pull through
  - pilot rope
- using at least three (3) of the following types of stringing equipment:
  - cable drum stands
  - cable trailers
  - ropes

  - rollers
  - sheaves
  - stockings
  - swivels
  - winches
- using at least one (1) of the following tensioning methods:
  - dynamometer
  - site board
  - beat (wave sagging)
  - theodolite
- using testing equipment in accordance with workplace requirements
- recording test results in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe work practices, including:
  - working on conductive poles
  - short circuiting/earthing de-energised low voltage (LV) and high voltage (HV) circuits
  - safe use of plant and equipment
- application, purpose and types of work permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods
- construction manuals, tension charts/tables, system diagrams/plans and drawings
- types, sizes, properties and characteristics of overhead conductors/cables
- types of LV and HV overhead conductor/cable connections
- types of LV and HV overhead conductor/cable terminations
- causes and effects of poor electrical connections

- overhead conductor/cable clearances, including:
  - to ground
  - to LV/HV structures
  - waterways
  - carriageways
  - buildings
  - bridges
  - railways
- techniques for conductor/cable installation, including:
  - types and application of tools, equipment and hardware
  - procedures for stringing, tensioning and termination of LV and HV conductors/cables.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and maintaining distribution overhead conductors and cables
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS008 Install and maintain electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain electrical apparatus in the electricity supply industry (ESI).

It includes assembling, installing, connecting, testing and commissioning electrical apparatus.

It also includes cleaning, repairing and replacing electrical apparatus.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

and

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

or

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain electrical apparatus	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.6 Hazards are identified, risks assessed and control measures identified and applied
	1.7 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.8 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.9 Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements

	1.10	Work permits are received and signed in accordance with workplace requirements
	1.11	Worksite is prepared in accordance with the work plan and workplace requirements
	1.12	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out installation of electrical apparatus	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, climbing, working at heights and the use of plant, tools and equipment are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Electrical apparatus is assembled and tested in accordance with work plan and workplace requirements
	2.8	Electrical apparatus is erected and connected in accordance with work plan and workplace requirements
	2.9	Electrical apparatus is tested and commissioned in accordance with work plan and workplace requirements
	2.10	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.11	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Carry out maintenance of electrical apparatus	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored

	3.2	Lifting, climbing, working at heights and the use of plant, tools and equipment are carried out in accordance with workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	3.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	3.6	Safe approach distances are maintained when the work is being performed
	3.7	Problem-solving methods are used to resolve problems from measured and calculated values in accordance with workplace requirements
	3.8	Electrical apparatus faults are identified in accordance with workplace requirements
	3.9	Electrical apparatus is repaired or replaced in accordance with workplace requirements
	3.10	Electrical apparatus is tested and returned to service in accordance with workplace requirements
	3.11	Incidents or unplanned events are responded to in accordance with workplace requirements
	3.12	Quality checks of work are undertaken in accordance with work plan and workplace requirements
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

4.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

4.6 Work permits are signed off in accordance with workplace requirements

4.7 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is not equivalent to:

- UETTDRIS41 Install network infrastructure electrical equipment
- UETTDRIS42 Maintain network infrastructure electrical equipment

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS008 Install and maintain electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- connecting and terminating conductors and cables in accordance with workplace requirements
- installing and maintaining electrical apparatus for at least one (1) of the following:
  - transformers
  - reactors
  - regulators
  - capacitors
- installing and maintaining electrical switching apparatus, including least one (1) of the following:
  - reclosers
  - motorised switch
  - gas-filled switch
  - oil-filled switch
  - air-break switch
  - vacuum switch
- installing and maintaining electrical apparatus for at least three (3) of the following:
  - fuse switches
  - sectionalisers
  - dropout fuses
  - disconnectors
  - links
  - fuses

    - surge arrestors
    - line fault indicators
- conducting at least five (5) of the following tests:
    - voltage
    - phasing
    - current
    - insulation resistance
    - neutral identification
    - polarity
    - phase rotation
    - loop impedance
    - earth resistance
- dealing with an unplanned event on at least one (1) occasion
- recording test results in accordance with workplace requirements
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
    - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant and equipment
- application, purpose and types of work permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- construction manuals, system diagrams/plans and drawings
- characteristics of a transformer, including:
    - basic construction of distribution transformers
    - operation under load/no-load conditions
    - types and basic operation of tap changing switches
    - efficiency and cooling
- installation and maintenance of a transformer, including:
    - basic connections
    - restrictions to parallel operation
    - testing

    - fault-finding procedures
    - earthing types and configurations
- types and function of electrical apparatus, including:
    - reactors
    - regulators
    - capacitors
    - surge arrestors
    - fault indicators
- types and function of various switchgear/protection apparatus, including:
    - isolators
    - air-break
    - gas-filled
    - oil-filled
    - vacuum type
    - links
    - fuses
    - sectionalisers
    - reclosers
    - operating characteristics
    - advantages and disadvantages of different types of switchgear
    - earthing functions
- installation and maintenance procedures for electrical apparatus
- procedures for diagnosing and rectifying faults
- procedures for testing and commissioning procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Evidence should show demonstrated competency working at heights, in limited spaces, with different structural/construction types and method and in a variety of environments.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and maintaining electrical apparatus
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS009 Install and maintain ESI network infrastructure electrical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the installation and maintenance of electrical equipment, such as fuse switches, drop-out switches, sectionalisers, links, surge arrestors, gas-filled and/or oil-filled switches, which are relevant to the transmission, distribution and rail networks.

It includes the termination/connection of the equipment in accordance with enterprise requirements, the repair and/or replacement of like-for-like electrical equipment and associated hardware, and sampling of insulating oils. It also encompasses the identification of faults, the relevant pre-commissioning tests involving the equipment/system and the interpretation of these tests against agreed specifications.

It excludes the energisation of the equipment maintained in a highly complex, interdependent and interconnected electricity supply network system, where the effects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Troubleshoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for the installation and maintenance of network infrastructure electrical equipment	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection

1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the installation and/or maintenance of network infrastructure electrical equipment are obtained and confirmed for the purposes of the work to be performed

1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures

1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear according to established procedures

1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE) required for the job are obtained and confirmed in working order

1.8 Relevant personnel at worksite are confirmed current in first aid, pole top rescue and other related work procedures according to requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved to carry out work, where necessary

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures

1.12 Road signs, barriers and warning devices are positioned in accordance with requirements

2 Carry out installation and maintenance of network infrastructure electrical equipment	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed, and currency according to requirements confirmed
	2.3	Essential knowledge and associated skills are applied in the safe installation of network infrastructure electrical equipment to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.4	Electrical equipment and associated hardware are positioned, secured and terminated/connected in accordance with requirements and established procedures
	2.5	Maintenance, including repair and/or replacement of network infrastructure electrical equipment, is carried out in accordance with the work schedule and requirements/established procedures
	2.6	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.7	Unplanned events in the installation of electrical equipment (network infrastructure) are undertaken within the scope of established procedures
	2.8	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.9	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation and maintenance of network infrastructure electrical equipment	**3.1**	Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable

3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permit(s) are signed off and electrical equipment (network infrastructure) are returned to service in accordance with requirements

3.6 Work completion records, reports, as installed/modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS46 Install and maintain ESI network infrastructure electrical equipment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS009 Install and maintain ESI network infrastructure electrical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- installing and maintaining any three (3) of the following:
  - fuse switches
  - drop-out fuses
  - sectionalisers
  - disconnectors
  - links
  - fuses
  - surge arrestors
- installing and maintaining any one (1) of the following:
  - reclosers
  - motorised switches
  - gas-filled switches
  - ring main units
  - line fault indicators
  - oil-filled switches
  - air-break switches
- installing and maintaining any one (1) of the following:
  - transformers
  - reactors
  - regulators
  - capacitors
  - relays
  - line fault indicators

    - with regards to the above incorporate any three (3) of the following:
        - voltage detectors
        - phasing equipment
        - clip-on ammeters
        - insulation resistance testers
        - recording meters
        - earth resistance tester
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- mathematical techniques encompassing:
    - calculations involving fractions, decimals, ratios and proportions
    - calculations involving area, volume, mass and density
    - calculations involving transposition and substitution of formulae
    - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
    - identification of basic concepts, principles and applications - application of velocity, acceleration, force, density, torque and pressure
    - applications of the International System of Units (SI) units
    - the relationship between work, power and energy
    - behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces, and determining the sag in a catenary conductor and the force applied at each end
    - fundamentals of the basic laws of fluid mechanics
- materials properties encompassing:
    - identification and classification of engineering materials material properties
    - types and applications - properties of tensile strength; effects of temperature on the expansion of metals; ductility, malleability, work hardening and annealing and the conditions that lead to corrosion; and the properties of timbers
- basic rigging techniques encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with rigging, including the operation of cranes, hoists and winches, and relevant certification and licensing (as required)
    - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
    - safe use of rigging equipment, tools and associated equipment - types, techniques and application
    - site inspection procedures - identifying hazards, assessing and controlling risks, and

appropriate sequence of loading and unloading
    - determining the mass and dimensions of load
    - selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan), ratings of wire ropes and slings, removing, repairing and replacing of damage parts
    - techniques for assembling and erecting power winches and capstans
    - checking the integrity of support structure - visual inspection of load connections
    - techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth/state/territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, and load stability
- procedures in providing store support encompassing:
    - classification and identification of equipment, components and tools
    - procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security and bookkeeping/record keeping
    - material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks, forklifts and cable drum handling equipment
    - safety procedures - storage and care of safety equipment, handling hazardous materials, storage of hazardous substances and dangerous goods, and depot safety procedures
    - manufacturer and supplier information, including material safety data sheets (MSDS)
- generation systems encompassing:
    - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
    - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
    - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
    - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
    - characteristics of a transmission, a distribution and a rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
    - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
    - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
    - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment

- characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
- auxiliary equipment used on transformers - function and basic operation of equipment
- maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault-finding procedures
- description, purpose and characteristics of a reactors

- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors - types of low voltage (LV) and HV overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; and minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of LV and HV conductors
- safe working practices and procedures for the installation of overhead distribution conductors encompassing:
  - limits of approach for personnel, vehicles, mobile plant and elevated work platforms (EWP)
  - requirements of persons prior to making bare-hand contact with dead LV mains and apparatus
  - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
  - safe working practices - requirements to enable safe working on conductive poles, procedure to attach an on-site earthing device to de-energised LV and HV overhead circuit
- installation of poles and/or structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - characteristics and applications of different types of poles and associated hardware
  - techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, clearances between conductors, safe methods of erecting and stabling poles and-or structures and cross-arms
  - techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles, methods of strengthen poles, maintenance and replacement of HV

insulators and cross-arms

- installation of LV electrical services encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings types of LV overhead services, methods of construction and installation, minimum clearances for overhead services to assets and structures, and types of installation equipment/tools
  - characteristics and applications of different types of cables - cable cross-sectional area of conductors, current rating and fuse type
  - techniques for maintenance of service installations - diagnosis and repair of faults
  - jointing and terminating methods - polymeric heat shrink materials, polymeric tape materials, energised and de-energised cables, connections to fuse boxes and pole top boxes
  - testing and commissioning procedures – inspection, polarity, voltage and phase sequence tests
  - construction types and structures for distribution and sub transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors, - types of LV and HV overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; and minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of LV and HV conductors
- powerline safety practices encompassing:
  - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel; and the types of protective apparatus and apparel used for the line worker
  - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from overhead conductors
  - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedures for climbing an overhead structure and fitting a pole chair
  - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, demonstration of the procedure used to provide an effective traffic management scheme, and the use of a two-way radio
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; general fire prevention methods; and the precautions for personal protection when fighting small fires

- rescue victims from heights and confined spaces - planning and identifying procedures, establishing responses and developing techniques; involving external emergency services; and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
- requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS010 Install and maintain low voltage overhead services

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain low voltage (LV) overhead services in the electricity supply industry (ESI).

It includes the installation, connection, repair and replacement of service cables and hardware between the customer's connection point and the network point of supply.

It also includes the identification, rectification of faults, testing and commissioning requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain LV overhead services	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Pre-climbing assessment is conducted in accordance with workplace requirements
	1.7 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.8 Worksite is prepared in accordance with work plan workplace requirements
	1.9 Traffic management plan is confirmed as being in place in accordance with workplace requirements
	1.10 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.11 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements

	1.12	Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
2 Carry out installation and maintenance of LV overhead services	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are used in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Specialised energised LV equipment to work on energised LV overhead services is used in accordance with workplace requirements
	2.8	LV overhead service and hardware are installed in accordance with the work plan and workplace requirements
	2.9	LV overhead service and hardware are maintained in accordance with the work plan and workplace requirements
	2.10	LV overhead service is tested and commissioned in accordance with the work plan and workplace requirements
	2.11	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.12	Quality checks of work are undertaken in accordance with work plan, network standards and workplace requirements
3 Complete work and	**3.1**	Completed work is checked for compliance against the

documentation		work plan, network standards in accordance with workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work records, reports and documentation are completed in accordance with network standards and workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS56 Install and maintain low voltage overhead services.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS010 Install and maintain low voltage overhead services

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational and workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - network standards
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- preparing worksite, including:
  - identifying common pole markings i.e., condemned poles
  - conducting safe to approach tests as required
  - assessing network assets for pre-climbing (poles)
  - identifying potential secondary points of contact
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- applying energised/live low voltage (LV) working requirements and procedures in accordance with workplace requirements
- stringing and connecting low voltage (LV) overhead service cables, including at least two (2) of the following:
  - three phase
  - single phase
  - two phase
- installing LV overhead service protection devices, including at least one (1) of the following:
  - service fuse
  - circuit breakers (pole)
  - service link
- using at least three (3) of the following specialised energised LV equipment:
  - insulating gloves*
  - insulating mats/sleeves/tubes*

    - tensioning devices
    - insulated tools
    - pole shrouds
    - (*must do)
- performing at least five (5) of the following LV overhead service tests:
    - neutral integrity*
    - polarity*
    - voltage
    - current
    - phase rotation
    - insulation resistance
    - neutral identification
    - loop impedance
    - earth resistance
    - (*must do)
- recording test results in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
    - WHS/OHS
    - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and specialised equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- identification and control methods of secondary points of contact
- types and application of specialised energised LV equipment, including:
    - insulating gloves
    - insulating mats/sleeves/tubes
    - tensioning devices
    - insulated tools
    - pole shrouds
- safety observer:

  - role and responsibilities
  - communication methods
- construction manuals, system diagrams/plans and drawings, including:
  - minimum clearances for overhead services to assets and structures
  - ground clearances for overhead services
  - customer poles
  - network standards
- types, characteristics and applications of service cables, including:
  - cable cross-sectional area of conductors
  - current rating and fuse types and ratings
  - maximum span lengths and tensions for overhead services
- stringing and terminating methods
- connection of overhead services, including:
  - types of overhead service connections
  - live LV work principles and procedures
  - LV distribution mains protection systems
  - purpose and function of the multiple earth neutral (MEN) system
  - causes and effects of connection faults
  - standard phase sequencing
  - purpose and operation of service fusing
- procedures for maintenance of overhead service installations, including:
  - diagnosis and rectification of faults
  - removing, repairing and replacing damaged overhead services
  - removing and replacing service protection devices
- testing and commissioning overhead services, including:
  - pre-energising tests - insulation resistance and continuity test
  - inspection
  - test equipment functionality and interpretation
  - principles of loop impedance
  - polarity, voltage and phase sequence tests
  - neutral and phase identification tests
  - neutral integrity tests
  - use of independent earth
  - recording results.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and maintaining LV overhead services
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS011 Install and maintain low voltage underground services

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain low voltage (LV) underground services in the electricity supply industry (ESI).

It includes the connection, repair and replacement of service cables and hardware between the customer's connection point and the network point of supply.

It also includes the identification and rectification of faults and testing and commissioning requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under State and Territory legislative and regulatory licensing or network operator requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Industry Specific Cross Discipline

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain LV underground services	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.7 Worksite is prepared in accordance with the work plan and workplace requirements
	1.8 Traffic management plan is confirmed as being in place in accordance with workplace requirements
	1.9 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.10 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
2 Carry out installation and maintenance of LV	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to

underground services		be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	LV underground service and hardware are installed in accordance with the work plan and workplace requirements
	2.7	LV underground service and hardware are maintained in accordance with the work plan and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS55 Install and maintain low voltage underground services.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS011 Install and maintain low voltage underground services

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- applying energised/live low voltage (LV) working requirements and procedures in accordance with workplace requirements
- connecting LV underground services to at least two (2) of the following:
  - underground pillar/pit connection (single phase)
  - underground pillar/pit connection (three phase)
  - underground to overhead connection
- using the following specialised energised LV equipment:
  - insulating mats/covers
  - insulating gloves
- testing of LV underground service connections, including at least four (4) of the following tests:
  - polarity*
  - neutral integrity*
  - phase rotation
  - continuity
  - voltage
  - insulation resistance
  - (* must do)
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- safety observer:
  - role and responsibilities
  - communication methods
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- requirements for the use of workplace construction manuals, system diagrams/plans and drawings, including:
  - types of LV underground services
  - methods of construction and installation
  - minimum depths for underground services to be buried and proximity to other assets and structures
- materials for underground service installation
- methods of laying underground service cables
- characteristics and applications of different types of cables
- diagnosis and repair of faults
- jointing and terminating methods in a:
  - fuse box
  - pillar and pit
  - customer installation
- testing and commissioning underground services, including:
  - pre-energising tests - insulation resistance and continuity test
  - inspection
  - test equipment functionality and interpretation
  - polarity, voltage and phase sequence tests
  - neutral and phase identification tests
  - neutral integrity tests
  - recording results
- connection principles, including:
  - energised/live work requirements and procedures
  - purpose and function of multiple earth neutral (MEN) system
  - types of connection faults

- causes and effects of incorrect and poor electrical connections
- principles of loop impedance
- reasons for and methods used to maintain standard phase sequencing
- purpose and operation of service fusing
- use of independent earth for testing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and maintaining LV underground services
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS012 Install and maintain poles, structures and hardware

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain poles, structures and hardware in the electricity supply industry (ESI).

It includes assembling, fixing and attaching hardware, erecting, stabilising, repairing, replacing and supporting poles and structures (excluding towers).

It also includes repairing and replacing hardware.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain poles, structures and hardware	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.7 Work permits are received and signed in accordance with workplace requirements
	1.8 Worksite is prepared in accordance with the work plan and workplace requirements
	1.9 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out installation and maintenance of poles, structures and hardware	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Hardware is assembled and fixed to the pole/structure in accordance with work plan and workplace requirements

	2.5	Poles or structures are erected and stabilised in accordance with work plan and workplace requirements
	2.6	Hardware is maintained in accordance with work plan and workplace requirements
	2.7	Poles or structures are maintained in accordance with work plan and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are signed off in accordance with workplace requirements
	3.7	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector

Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS52 Install and maintain poles, structures and associated hardware.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS012 Install and maintain poles, structures and hardware

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- installing and maintaining at least one (1) of the following pole/structure types:
  - wood
  - steel
  - concrete
  - composite
- installing and maintaining at least three (3) of the following hardware types:
- insulators
- cross-arm braces
- cross arms
- pole steps
- shackle straps
- earth leads
- traction supports
- traction registration
- bonding
- using at least one (1) of the following pole stabilisation methods:
  - compaction
  - baulking
  - stays
  - concreting (including formwork)
- dealing with an unplanned event on at least one (1) occasion
- obtaining and signing on and off relevant work permits in accordance with workplace

requirements
- completing relevant work records, reports and documentation

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant and equipment
- application, purpose and types of work permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- construction manuals, system diagrams/plans and drawings
- characteristics and applications of different types of poles/structures and hardware
- installation of poles/structures and hardware, including:
  - stays/guys
  - erection methods
  - types of installation equipment/tools
  - excavation methods
  - types of footings/foundations
  - types of attachments
  - earthing
  - bonding
  - safe methods of erecting and stabilising poles/structures and cross arms
- maintenance of poles/structures and hardware, including:
  - stays/guys
  - supporting unstable poles/structures
  - strengthening methods
  - insulators and cross arms.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and maintaining poles, structures and hardware
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS013 Install and maintain public lighting systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain public lighting systems in the electricity supply industry (ESI).

It includes installing underground and/or overhead public lighting system, poles/columns, hardware and control equipment.

It also includes testing and commissioning, inspecting and maintaining the public lighting system.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDRDO005 Maintain overhead energised low voltage distribution network

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain public lighting systems	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.7 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.8 Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.9 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements

	1.10	Worksite is prepared in accordance with the work plan and workplace requirements
	1.11	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out installation and maintenance of underground public lighting systems	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights, the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Excavation/foundation construction is inspected in accordance with the work plan and workplace requirements
	2.8	Pole/column, hardware and control equipment are assembled in accordance with the work plan and workplace requirements
	2.9	Pole/column is erected and stabilised in accordance with the work plan and workplace requirements
	2.10	Earthing and public lighting circuits are installed in accordance with the work plan and workplace requirements
	2.11	Public lighting system is tested and commissioned in accordance with the work plan and workplace requirements
	2.12	Public lighting and associated hardware are inspected in accordance with workplace requirements

	2.13	Public lighting systems are maintained in accordance with the work plan and workplace requirements
	2.14	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.15	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Carry out installation and maintenance of overhead public lighting systems	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Lifting, climbing, working at heights, and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	3.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	3.6	Safe approach distances are maintained when the work is being performed
	3.7	Hardware, fittings and control equipment are assembled in accordance with the work plan and workplace requirements
	3.8	Public lighting is installed in accordance with the work plan and workplace requirements
	3.9	Public lighting system is tested and commissioned in accordance with the work plan and workplace requirements
	3.10	Public lighting and associated hardware are inspected in accordance with workplace requirements
	3.11	Public lighting systems are maintained in accordance with the work plan and workplace requirements
	3.12	Incidents or unplanned events are responded to in accordance with workplace requirements

	3.13	Quality checks of work are undertaken in accordance with work plan and workplace requirements
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS53 Install and maintain power system public lighting.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS013 Install and maintain public lighting systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- installing and maintaining public lighting poles/columns
- installing and maintaining public lighting hardware, including any three (3) of the following:
  - luminaires
  - photoelectric cells
  - lamps
  - fuses
  - control components
  - brackets
- conducting at least five (5) of the following tests:
  - voltage
  - current
  - insulation resistance
  - neutral identification
  - polarity
  - loop impedance
  - earth resistance
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - inspection, testing and commissioning of public lighting systems
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods
- construction manuals, system diagrams/plans and drawings for public lighting
- basic public lighting principles
- types, function and operation of lanterns/luminaires/lamps
- types, function and operation of control equipment
- types and function of poles/columns
- types and function of hardware used for public lighting
- overhead and underground public lighting systems
- controlling and switching of public lighting systems
- methods for the installation of public lighting systems
- maintenance of public lighting systems, including:
  - fault types and causes
  - cleaning
  - removing, repairing and replacing hardware.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and maintaining public lighting systems
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS014 Install and replace energy meters and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and replace energy meters and associated equipment in the electricity supply industry (ESI).

It includes installing, replacing, testing and commissioning of whole current energy meters and associated equipment in accordance with workplace requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install or replace energy meters and associated equipment	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.7 Worksite is prepared in accordance with the work plan and workplace requirements
2 Carry out the installation of new energy meters and associated equipment	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Installation of energy meters and associated equipment is performed in accordance with the work plan and workplace requirements
	2.5 Energy meter is energised and tested in accordance with workplace requirements
	2.6 Incidents or unplanned events are responded to in accordance with workplace requirements

	2.7	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Carry out the replacement of energy meters and associated equipment	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Lifting and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Energy meter is read, isolated and tested to prove de-energised in accordance with workplace requirements
	3.5	Replacement of energy meters and associated equipment is performed in accordance with the work plan and workplace requirements
	3.6	Energy meter is energised and tested in accordance with workplace requirements
	3.7	Incidents or unplanned events are responded to in accordance with workplace requirements
	3.8	Quality checks of work are undertaken in accordance with work plan and workplace requirements
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is cleaned and made safe in accordance with workplace requirements
	4.4	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS60 Install and replace power system energy meters and associated equipment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS014 Install and replace energy meters and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- installing whole current energy meters
- reading, testing and replacing whole current energy meters
- installing associated metering equipment
- replacing associated metering equipment
- energising and testing of whole current energy meters and associated equipment
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - energy meters and associated equipment
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- construction, operation and selection of whole current energy meters

- construction, operation and selection of associated metering equipment
- metering arrangements, including direct, distributed master, multiple master, plug-in and multiple earth neutral (MEN) system
- cable types and applications
- installation and replacement of energy meters, including:
  - stripping cable
  - cable terminations
  - meter wiring positions
  - service protection device (SPD)
  - meter boards
- testing procedures, including:
  - voltage
  - continuity
  - insulation resistance
  - polarity
  - phase sequence
  - neutral integrity
  - meter functionality
- procedures for recording energy meter documentation
- techniques for the maintenance of energy metering, including fault finding, fault rectification, meter reading and tariff changes.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and replacing energy meters and associated equipment
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS015 Install low voltage mobile generator

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install a low voltage (LV) mobile generator in the electricity supply industry (ESI).

It includes selecting, connecting, synchronising, operating and disconnecting of a temporary mobile generator to LV network assets to maintain supply.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install LV mobile generator	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Worksite is prepared in accordance with the work plan and workplace requirements
	1.8 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out the installation of LV mobile generator	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 LV mobile generator is installed in accordance with the work plan and workplace requirements
	2.5 LV mobile generator is synchronised to LV network in accordance with the work plan and workplace

		requirements
	2.6	LV mobile generator is monitored in accordance with the work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.3	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.4	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.5	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS61 Install mobile generation set for synchronised LV Genset.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS015 Install low voltage mobile generator

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- operating a generator
- connecting a generator
- disconnecting a generator
- synchronising of generator onto the low voltage (LV) network without interruption to supply
- synchronising of generator off the LV network without interruption to supply
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- events constituting an unplanned event or incident
- safety precautions specific to installing mobile generators
- techniques in the connecting, operating and disconnecting of generators, including:
  - synchronising of generator control systems onto and off the network without interruption to supply

  - estimation of LV load
  - assessing the appropriateness of the generator
  - multiple generators
- connections to the network, including:
  - overhead
  - indoor substations
  - customer installations
  - kiosk substations.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing LV mobile generators
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS016 Install mobile generation set for synchronised HV Genset

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers installation of temporary portable generation sets to high voltage (HV) distribution assets thereby maintaining supply in accordance with industry regulations and established procedures. It encompasses the operation, connection and disconnection of a temporary portable generator and includes the estimation of HV load and assessing the appropriateness of the generator for the required outcome and networking of generators.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL005 Work safely in the vicinity of live electrical apparatus

Transmission Overhead Pathway Group

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS017 Perform high voltage field switching operation to a given schedule

UETDRTO006 Install and maintain transmission conductors

UETDRTO007 Install and maintain transmission structures and hardware

Distribution Overhead Pathway Group

UETDRDO005 Maintain overhead energised low voltage distribution network

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS008 Install and maintain electrical apparatus

UETDRIS010 Install and maintain low voltage overhead services

UETDRIS012 Install and maintain poles, structures and hardware

UETDRIS018 Perform low voltage field switching operation to a given schedule

Rail Traction Pathway Group

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT002 Install overhead traction components and equipment

UETDRRT003 Install rail traction bonds

UETDRRT004 Install traction overhead wiring systems

UETDRRT009 Maintain overhead traction components and equipment

UETDRRT011 Maintain traction overhead wiring systems

UETDRRT013 Perform rail traction switching operations to a given schedule

Distribution Cable Jointing Pathway Group

UETDRDU013 Joint, terminate and maintain high voltage underground polymeric cable

UETDRDU015 Joint, terminate and maintain low voltage underground polymeric cable

UETDRDU016 Lay power cables

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDRIS008 Install and maintain electrical apparatus

UETDRIS011 Install and maintain low voltage underground services

UETDRIS018 Perform low voltage field switching operation to a given schedule

Electrical Pathway Group

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETDRSB001 Perform substation switching operations to a given schedule

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to install mobile generation set for synchronised HV Genset	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures

	1.3	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.4	Relevant requirements and established procedures for the work are to all personnel and identified for all worksites
	1.5	WHS/OHS policies and procedures related to the work are identified to ensure safe systems of work are followed
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the installation of mobile generation set for synchronised HV	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in

Genset		accordance with requirements and/or established procedures
	2.2	First aid and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Installation of mobile generation set for synchronised HV Genset is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe installation of mobile generation set for synchronised HV Genset to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the installation of mobile generation set for synchronised HV Genset	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe

in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permits are signed off and synchronised HV Genset apparatus is returned to service and client/customer advised in accordance with requirements

3.6 Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS64 Install mobile generation set for synchronised HV Genset.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS016 Install mobile generation set for synchronised HV Genset

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing all of the following:
  - autonomous installation of a mobile generator set for synchronised high voltage (HV) Genset incorporating operation, connection and disconnection of the generator
  - evaluating load characteristics associated with networking of generators
  - synchronisation of the generator control systems onto and off the network without interruption to supply
  - estimation of HV load and assessing the appropriateness of the generator
  - operating a generator in parallel to a single HV job
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- installation of a HV mobile generation encompassing:
  - safety precautions specific to installing mobile generators - safe working policies, practices and procedures; techniques in connecting, operating and disconnecting generators; types of tools and equipment; and safe use of tools and equipment
  - techniques in the installation of generator sets - the connection of generator onto and off the network without interruption to supply and estimation of HV load
  - assessing the appropriateness of the generator
- HV generator control systems encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
  - safety precautions specific to the synchronisation of generator sets - safe working

policies, practices and procedures; and synchronising procedures
    - techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of HV load and assessing the appropriateness of the generator
    - operating a generator in parallel to a single HV job - overhead systems, indoor systems, customer installations and kiosk substations
    - HV generator set and control system to HV distribution assets
- powerline safety practices encompassing:
    - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
    - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from overhead conductors
    - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedures of climbing an overhead structure and fitting a pole chair
    - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements the procedures used to provide an effective traffic management scheme and the use of a two-way radio
    - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; general fire prevention methods and the precautions for personal protection when fighting small fires
    - rescue victims from heights and confined spaces - planning and identifying procedures, establishing responses, developing techniques, involvement of external emergency services, and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
    - requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, and requirements for effective communications operations for aerial work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so;

where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS017 Perform high voltage field switching operation to a given schedule

Modification History

Release 2. Unit application updated for clarification.

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to perform high voltage (HV) field switching operation to a given schedule in the electricity supply industry (ESI).

It includes the approval process, isolating, paralleling and restoring HV overhead and underground electricity networks using circuit breaking and isolating equipment, specialised tools, personal protective equipment (PPE) and testing equipment.

It also includes proving de-energised, short circuiting and earthing, preparing, issuing and cancelling work permits.

Note: *Those holding an existing Certificate III ESI Distribution Overhead, Distribution Underground ualification or equivalent meets the prerequisite unit requirements.*

Those holding an existing Diploma / Advanced Diploma of ESI Power Systems or Certificate III Electrotechnology Electrician qualification or equivalent partially meets the prerequisite unit requirements. They are still required to complete:

- *UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus*
- *UETDREL005 Work safely in the vicinity of live electrical apparatus*
- *UETDRIS018 Perform low voltage field switching operation to a given schedule*

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS018 Perform low voltage field switching operation to a given schedule

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for HV field switching	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Switching schedule is obtained and confirmed in accordance with workplace requirements
	1.3 Plant, tools, equipment and PPE required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with switching schedule and workplace requirements
	1.6 Work permit/approval is organised in accordance with workplace requirements
	1.7 Worksite is prepared in accordance with workplace requirements

2 Carry out HV field switching	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Communication with switching controller is established and maintained during switching in accordance with workplace requirements
	2.5 Approval is obtained to commence HV field switching in accordance with switching schedule and workplace requirements
	2.6 HV field switching is performed in accordance with the switching schedule and workplace requirements
	2.7 Work permit is written and issued in accordance with the switching schedule and workplace requirements
	2.8 Work permit is cancelled or relinquished in accordance with workplace requirements
	2.9 Approval is obtained to commence restoration of HV supply in accordance with switching schedule and workplace requirements
	2.10 HV field switching is performed to restore network to normal in accordance with the switching schedule and workplace requirements
	2.11 Switching controller is notified HV restoration has been completed in accordance with switching schedule and workplace requirements
	2.12 Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1** Incidents or unplanned events are reported in accordance with workplace requirements
	3.2 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements

3.3 Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.4 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS44 Perform HV field switching operation to a given schedule.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS017 Perform high voltage field switching operation to a given schedule

Modification History

Release 2. Unit application updated for clarification.

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- verifying switching scheduling documents
- establishing and maintaining communications with the following:
  - switching controller
  - permit holders
  - other network stakeholders
- obtaining approval to perform high voltage (HV) field switching to a given schedule
- performing HV field switching operation to a given schedule completing at least two (2) of the following:
  - isolation
  - restoration
  - paralleling
- performing at least two (2) of the following tests:
  - proved de-energised*
  - voltage
  - phasing
  - (*must do)
- operating at least four (4) of the following HV electrical apparatus:
  - HV links/isolators/disconnectors
  - air-break switches
  - fuses

  - ring main switch
  - earth switches
  - reclosers
  - circuit breakers
  - sectionalisers
  - live line clamps
  - load break elbows
- using at least two (2) of the following specialist tools and equipment:
  - HV phasing sticks
  - HV ground mounted equipment isolating handles
  - HV operating sticks
  - HV earths
- using tags and locks
- organising, issuing, cancelling or relinquishing relevant work permits/approvals in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of work permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- types, characteristics and capabilities of specialised tools and testing equipment, including:
  - insulated equipment
- purpose, layout and application of switching schedules
- HV field switching principles and procedures, including:
  - roles and responsibilities
  - procedures for coordination of operations
  - isolation, restoration and paralleling
  - proving de-energised
  - earthing

  - pre- and post-switching checks
  - fault finding
  - alternate sources of supply and possible back-feed
  - primary causes, effects and types of HV electrical faults
  - emergency fault procedures
  - operation of HV switchgear
  - HV feeder auto-reclosing suppression
- distribution protection systems, including:
  - types, operation and applications
  - protection equipment
- HV switchgear, including:
  - types and categories (including live line clamps)
  - application, function and operating capabilities
- application and function of the single wire earth return (SWER) system components, including:
  - circuit arrangement
  - principle of operation
  - hazards and procedures associated with faulty SWER earth systems
  - procedure to isolate, energise and commission SWER transformer
- operation of HV distribution transformers, including:
  - principles governing factors for transformer ratings
  - operating limitations and the relationship between transformer and HV fuse rating
  - purpose and principle operation of HV distribution transformer tap changers
  - paralleling requirements
- functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
- function of the main components of a local/remote control system.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for perform HV field switching operations to a given schedule
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS018 Perform low voltage field switching operation to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to perform low voltage (LV) field switching operation to a given schedule in the electricity supply industry (ESI).

It includes isolating, paralleling and restoring LV overhead and underground electricity networks using circuit breaking and isolating equipment.

It also includes the approval process, using specialist tools, personal protective equipment (PPE), testing, short circuiting for switching and preparing, issuing and cancelling work permits.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for LV field switching	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Switching schedule is obtained and confirmed in accordance with workplace requirements
	1.3 Plant, tools, equipment and PPE required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with switching schedule and workplace requirements
	1.6 Work permit/approval is organised in accordance with workplace requirements
	1.7 Worksite is prepared in accordance with workplace requirements
2 Carry out LV field switching	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Communication with switching controller is established and maintained during switching in accordance with workplace requirements

	2.5	Approval is obtained to commence LV field switching in accordance with switching schedule and workplace requirements
	2.6	LV field switching is performed to isolate supply in accordance with the switching schedule and workplace requirements
	2.7	Work permit is written and issued in accordance with the switching schedule and workplace requirements
	2.8	Work permit is cancelled or relinquished in accordance with workplace requirements
	2.9	Approval is obtained to commence restoration of LV supply in accordance with switching schedule and workplace requirements
	2.10	LV field switching is performed to restore supply in accordance with the switching schedule and workplace requirements
	2.11	Switching controller is notified LV restoration has been completed in accordance with switching schedule and workplace requirements
	2.12	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Incidents or unplanned events are reported in accordance with workplace requirements
	3.2	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.3	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.4	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS43 Perform low voltage field switching operation to a given schedule.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS018 Perform low voltage field switching operation to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- verifying switching scheduling documents
- establishing and maintaining communications with the following:
  - switching controller
  - permit holders
  - other network stakeholders
- obtaining approval to perform low voltage (LV) field switching to a given schedule
- performing LV field switching operation to a given schedule completing at least two (2) of the following:
  - isolation
  - restoration
  - paralleling
- performing at least two (2) of the following tests:
  - proved de-energised*
  - voltage
  - current
  - phasing
  - (*must do)
- operating at least two (2) of the following:
  - LV links
  - LV fuses
  - LV circuit breakers
- using at least one (1) of the following:

  - short circuiting equipment
  - operating sticks
- using tags and locks
- organising, issuing, cancelling or relinquishing relevant work permits/approvals in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- types, characteristics and capabilities of specialised tools and testing equipment
- purpose, layout and application of switching schedules
- LV field switching principles and procedures, including:
  - roles and responsibilities
  - procedures for coordination of operations
  - isolation, restoration and paralleling
  - proving de-energised
  - short circuiting
  - pre- and post-switching checks
  - fault finding
  - alternate sources of supply and possible back-feed
  - emergency fault procedures
- electrical operating/LV network diagrams and characteristics
- communication procedures
- danger tag and lockout procedures
- types, characteristics and capabilities of electrical apparatus used as a LV isolation points.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for performing low voltage field switching operation to a given schedule
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRIS019 Sample, test, filter and reinstate insulating oil

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the filtering, sampling, testing and reinstating of insulating oil. It includes the dispatching of oil samples to a laboratory for higher level testing, if required. Post-operational servicing of equipment and/or plant and the identification of any related environment issues concerning disposal and safety are also associated with this unit.

The application of the skills and knowledge described in this unit may require a licence to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to sample, test, filter and reinstate insulating oil	**1.1** Work schedules, plans, drawings, workplace procedures and material lists are received and confirmed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) workplace procedures for sampling, testing, filtering and reinstating insulating oil are obtained and confirmed for the purposes of the work to be performed
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.6 Relevant work permits are obtained and signed in accordance with workplace procedures
	1.7 Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.8 Liaison and communication issues with authorised personnel, authorities, clients and landowners are resolved to perform work, as required
	1.9 Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures

	1.10	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.11	Traffic management is planned and implemented in accordance with workplace procedures
2 Carry out sampling, testing, filtering and reinstating of insulating oil	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures
	2.3	Requirements for lifting and/or climbing and/or working at heights and the use of power tools/equipment are followed in accordance with workplace procedures
	2.4	Sampling, testing, filtering and reinstating of insulating oil are applied to ensure completion in agreed timeframes, to quality standards and minimum waste in accordance with workplace procedures
	2.5	Sampling, testing, filtering and reinstating of the insulating oil is performed in accordance with work schedules, job requirements and workplace procedures
	2.6	Unplanned events in the filtering, sampling and testing of insulating oil are responded to in accordance with workplace procedures
	2.7	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.8	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the sampling, testing, filtering and reinstating of insulating oil	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required
	3.3	Worksite is cleaned and confirmed safe in accordance

with workplace procedures

3.4 Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage or disposed of in accordance with workplace procedures

3.5 Relevant work permits are signed off and equipment is returned to service in accordance with workplace procedures

3.6 Work records, reports and/or documentation are completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS47 Sample, test, filter and reinstate insulating oil.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRIS019 Sample, test, filter and reinstate insulating oil

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- sampling, testing, filtering and reinstating insulating oil on at least two (2) of the following pieces of equipment:
  - transformer main tank
  - transformer tap changer
  - switchgear
  - cable
  - reactor
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- filtering and sampling of insulating oil, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with filtering and sampling - safe handling procedures; personal hygiene, storage and disposal procedures; WHS/OHS hazards and precautions, including use of appropriate personal protective equipment (PPE); environmental procedures and effects of contaminates
  - properties of insulating oil - dielectric strength, moisture content, acidity and sludge
  - locations where insulating oil is used - transformer, switchgear and oil-filled cable
  - filtering equipment – types, cleaning procedures and method of use
  - techniques in filtering and sampling insulating oil - methods of sampling, methods of filtering, testing procedures on site and analysing oil effectiveness
  - frequency of testing

- testing of insulating oil, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with testing, such as precautions during testing and types of testing equipment
  - techniques in testing insulating oil - electric strength, water content, dielectric dissipation, resistivity and acidity
  - dissolved gas analysis (DGA)
- powerline safety practices, including:
  - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
  - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes; and the safety issues relating to clearances from overhead conductors
  - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedure of climbing an overhead structure and fitting a pole chair
  - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, demonstration of the procedures used to provide an effective traffic management scheme and the use of a two-way radio
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; general fire prevention methods and the precautions for personal protection when fighting small fires
  - rescue victims from heights and confined spaces - planning and identifying procedures; establishing responses; developing techniques; involvement of external emergency services; and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
  - requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work
- material handling and the environment, including:
  - methods of obtaining updated environmental information and data sheets on the proper use and handling of equipment and materials
  - environmental standards, codes, environmental legislation, WHS/OHS legislation, hazardous substances/dangerous goods regulations, supply authority regulations and/or enterprise requirements applicable environmental care when handling materials, including provision of manufacturer and supplier information such as material safety data sheets (MSDS)
  - types and application of PPE used for hazards substances and dangerous goods
  - techniques in handling equipment to eliminate/reduce risks to the environment from spillages of oils, herbicides, pesticides and chemicals from equipment, such as vehicle

loading crane, chainsaw, enterprise vehicles and explosive power tools
    - procedures for handling and control of spillages of herbicides
    - methods of disposing and storage of herbicides, pesticides and chemicals
    - methods of cleaning mobile plant, equipment and tools
    - recording of data
- environmental issues when undertaking sampling and filtering of oil, including:
    - environmental standards, codes, environmental legislation, supply authority regulations and/or enterprise requirements applicable to the work to be undertaken
    - methods of obtaining updated environmental information and data sheets on the proper use and handling of oil used on transformers and switchgear, including provision of MSDS
    - techniques in filtering and sampling oil to eliminate/reduce risks to the environment from spillages
    - safety procedures and equipment for handling and control of the oil
    - methods of disposing and storage of the oil
    - methods of cleaning equipment, tools and equipment
    - emergency procedures for spillages of oil to reduce risks to the environment - methods of cleaning up excessive spillages, methods of protection to surrounding environment, procedures for notification of relevant personnel and authorities, and recording procedures
    - polychlorinated biphenyl (PCB) contamination, handling and disposal procedures
- safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants, including:
    - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the handling and disposing of insulation or heat dissipation materials used in power distribution devices
    - identification of environmental issues associated with the handling and disposing of insulation materials
    - safety precautions when handling and disposing of heat dissipation materials
    - safe working practices
    - WHS/OHS hazards and precautions
    - identification of hazards, assessing and controlling risks
    - types, selection, maintenance and uses of PPE
    - permit to work systems and isolation procedures
    - types and function of specialised equipment
    - safe working practices when using specialised equipment
    - emergency response and rescue, including first aid
    - techniques in the handling and disposing of insulation materials - PCB, asbestos, insulating oil and SF6 gas
- enterprise-specific policies and procedure instructions, including:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures

- rules and regulations
- induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
- techniques when dealing with others - working in teams, customer relation, complaint and issues procedures
- overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion

- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs such as equipment operation
  - WHS/OHS records, including audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific specialised tools, including:
  - legislation, standards, codes, supply authority regulations and/specific enterprise regulations pertaining to the use and care of specialised tools - voltage detectors; polarity testers and phase rotation
  - characteristics, capabilities and application of specialised tools for a particular job
  - safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
  - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
  - techniques in pre-use inspection on the serviceability of specialised tools
  - techniques in the selection, use, maintenance and care and storage of specialised tools
  - identifying WHS/OHS hazards, assessing and controlling risks associated with their use

    - techniques for the safe use of specialised power tools
- substation safety practices, including:
    - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
    - techniques in the use of protective apparatus and apparel for substation work, including responsibilities about the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
    - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
    - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP) and any WHS/OHS requirements associated with the use of EWP
    - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
    - control of oil spills - identification, use and maintenance of spill oil control equipment and materials; and oil containment facilities and systems
    - rescue and release procedures - rescue of personnel from energised conductors, emergency descent from an EWP and/or rescue from confined spaces
    - enterprise requirements - safe access and authorisation to work procedures; use of mobile extendable equipment on or near energised HV conductors; emergency response procedures; hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction; and dangers of near approach to energised conductors.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRC001 Install and maintain low voltage overhead services in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain low voltage (LV) overhead services in a very remote community in the electricity supply industry (ESI).

It includes the installation, maintenance and connection of LV overhead service cables and associated equipment between the customer's connection point and the network point of supply.

It also includes testing and commissioning, identifying and rectifying faults, and the repair and replacement of service cables.

All installation and maintenance of LV overhead service cables in very remote communities must be undertaken in an isolated environment other than for testing purposes.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRC006 Perform low voltage electricity network switching in a very remote community

UETDRRC007 Solve problems in electrical network apparatus in a very remote community

UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

Competency Field

Remote Community

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain LV overhead services	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work permits are received and signed in accordance with workplace requirements
	1.6 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.7 Overhead electrical distribution network is verified as isolated and earthed/short circuited in accordance with workplace requirements
	1.8 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.9 Worksite is prepared in accordance with work plan and workplace requirements
	1.10 Traffic management plan is confirmed as being in place

		in accordance with workplace requirements
2 Carry out installation and maintenance of LV overhead services	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Installation and maintenance of the LV overhead service is completed in accordance with work plan and workplace requirements
	2.5	Earthing and short circuiting equipment is removed, permit signed off and overhead electrical distribution network is re-energised in accordance with workplace requirements
	2.6	LV overhead service connections are tested in accordance with work plan and workplace requirements
	2.7	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.8	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS36 Install and maintain low voltage services in remote communities (overhead).

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRC001 Install and maintain low voltage overhead services in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- verifying power systems electrical distribution network has been isolated and earthed and short circuited in accordance with work plan and workplace requirements
- connecting low voltage (LV) overhead service cables, including at least two (2) of the following:
  - three phase *
  - single phase
  - two phase
  - (* must do)
- installing LV overhead service protection devices, including at least one (1) of the following:
  - service fuse
  - circuit breakers (pole)
  - service link
- testing LV overhead service cable connections, including all the following:
  - polarity test
  - phase rotation test
  - continuity test
  - voltage test
  - neutral loop impedance
  - insulation resistance
- restoring supply to LV electricity networks in accordance with work plan and workplace

requirements
- working from at least one (1) of the following:
  - elevated work platform (EWP)
  - platform
  - ladder
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- types and characteristics of LV overhead service equipment, including:
  - connectors
  - insulation piercing connectors (IPCs)
  - service termination devices
  - fuse holders
  - fuses
  - service poles
  - point-of-attachment brackets
  - mains connection boxes
- construction manuals, system diagrams, plans and drawings
- types, sizes and characteristics of LV overhead service cables, including:
  - two, three and four-core cable
  - cable cross-sectional area of conductors
  - current ratings
  - cable insulation materials
- types of installation plant, equipment and tools, including:
  - EWPs
  - ladders
  - service cable puller and tension tool
  - stripping tools
  - ABC spanner and spreader

- installation techniques, including:
  - consumer poles
  - location of attachments
  - methods of stringing, tensioning and terminating
  - minimum clearances to assets, structures and the ground
  - maximum span lengths and service cable tensions
- connection principles, including:
  - relevant electrical access permit
  - purpose and function of the multiple earth neutral (MEN) system
  - types of connection faults
  - causes and effects of incorrect and poor electrical connections
  - principles of loop impedance
  - reasons for and methods used to maintain standard phase sequencing
  - purpose and operation of service fusing
- testing and commissioning procedures, including:
  - inspection
  - equipment functionality
- use of independent earth for testing:
  - continuity
  - insulation testing
  - polarity, voltage and phase sequence
  - neutral integrity
  - meter function
- connection testing forms and documentation
- techniques for maintenance of overhead services, including:
  - inspection
  - types of faults
  - diagnosis and repair of faults
  - removing and replacing services and fuses
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and maintaining overhead LV services in a very remote community
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRC002 Install and maintain low voltage underground services in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain low voltage (LV) underground services in very remote communities in the electricity supply industry (ESI).

It includes the installation and maintenance of LV underground services and associated equipment between the customer's connection point and the network point of supply.

It also includes testing and commissioning, identifying and rectifying faults, and the repair and replacement of service cables.

All installation and maintenance of LV underground service cables in very remote communities must be undertaken in an isolated environment other than for testing purposes.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRC006 Perform low voltage electricity network switching in a very remote community

UETDRRC007 Solve problems in electrical network apparatus in a very remote community

UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

Competency Field

Remote Community

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain LV underground services	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Underground electrical distribution network is verified as isolated and earthed/short circuited in accordance with workplace requirements
	1.7 Work permits are received and signed in accordance with workplace requirements
	1.8 Plant, tools, equipment, and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.9 Worksite is prepared in accordance with work plan and workplace requirements
	1.10 Traffic management plan is confirmed as being applied

		in accordance with workplace requirements
2 Carry out installation and maintenance of LV underground services	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Installation and maintenance of LV underground service is completed in accordance with work plan and workplace requirements
	2.5	Earthing and short circuiting equipment is removed, permit signed off and underground electrical distribution network is re-energised in accordance with workplace requirements
	2.6	LV underground services are tested in accordance with work plan and workplace requirements
	2.7	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.8	Quality checks of work are undertaken in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS37 Install and maintain low voltage services in remote communities (underground).

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRC002 Install and maintain low voltage underground services in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- verifying underground electrical distribution network has been isolated and earthed/short circuited in accordance with workplace requirements
- connecting low voltage (LV) underground services cables, including at least two (2) of the following:
  - underground pillar/pit connection (three phase)*
  - underground pillar/pit connection (single phase)
  - underground to overhead connection
  - (* must do)
- installing LV underground service protection devices, including at least one (1) of the following:
  - fuse units
  - circuit breakers
  - service links
- testing LV underground service cable connections, including all of the following:
  - polarity test
  - phase rotation test
  - continuity test
  - voltage test
  - insulation resistance
  - neutral loop impedance

- re-energising underground electrical distribution network in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- types, sizes and characteristics of LV underground service cables, including
  - two, three and four-core cable
  - cable cross-sectional area of conductors
  - current ratings
  - fuse types and ratings
  - cable insulation materials
- types and characteristics of LV service associated equipment, including:
  - conduit
  - heat/cold-shrink materials
  - cable labelling
  - pillars and pits
- construction manuals, system diagrams/plans and drawings
- types of installation plant, tools and equipment
- installation techniques, including:
  - methods of laying cable
  - sand and slabbing
  - minimum depths to assets in ground
- jointing and terminating methods, including:
  - polymeric heat/cold-shrink materials
  - polymeric tape materials
  - insulation piercing connectors (IPCs)
  - energised and de-energised cables
  - connections to point of entry, fuse boxes, pillars and pits
- connection principles, including:

  - purpose and function of the multiple earth neutral (MEN) system
  - types of connection faults
  - causes and effects of incorrect and poor electrical connections
  - principles of loop impedance
  - reasons for and methods used to maintain standard phase sequencing
  - purpose and operation of service fusing
  - relevant electrical access permit
- testing and commissioning procedures, including:
  - pre-energisation tests, including continuity and insulation resistance
  - inspection
  - equipment functionality
  - use of independent earth for testing
  - polarity, voltage and phase sequence
  - neutral and phase identification
  - neutral integrity
  - commissioning test forms and documentation
  - meter function
- completing workplace documentation
- techniques for the maintenance of underground services, including:
  - inspection
  - types of faults
  - diagnosis and repair of faults
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used for installing and maintaining LV underground services in a very remote community

- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRC003 Install and maintain public lighting systems in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain overhead and underground public lighting systems in very remote communities in the electricity supply industry (ESI).

It includes the installation and maintenance of public lighting poles/columns, street lighting cable, hardware and components, wiring and earthing systems. It also includes the inspection, testing and commissioning associated with the public lighting system.

All work on public lighting systems within very remote communities must be undertaken in an isolated environment other than for testing purposes.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRC006 Perform low voltage electricity network switching in a very remote community

UETDRRC007 Solve problems in electrical network apparatus in a very remote community

UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

Competency Field

Remote Community

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain public lighting systems	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Work is prioritised and sequenced for completion in accordance with workplan and workplace requirements
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Public lighting system is verified as isolated and earthed/short circuited in accordance with workplace requirements
	1.7 Work permits are received and signed in accordance with workplace requirements
	1.8 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.9 Worksite is prepared in accordance with work plan and workplace requirements
	1.10 Traffic management plan is confirmed as being in place

		in accordance with workplace requirements
2 Carry out installation and maintenance of public lighting systems	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Excavation/foundation construction is inspected and confirmed as compliant in accordance with work plan and workplace requirements
	2.5	Public lighting systems are installed and maintained in accordance with work plan and workplace requirements
	2.6	Hardware, fittings and control gear are installed in accordance with workplace requirements
	2.7	Street lighting cable and earthing systems are installed in accordance with workplace requirements
	2.8	Public lighting and hardware are inspected for compliance in accordance with work plan and workplace requirements
	2.9	Earthing and short circuiting equipment is removed, permit signed off and public lighting system is re-energised in accordance with workplace requirements
	2.10	Public lighting system is tested and commissioned in accordance with work plan and workplace requirements
	2.11	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.12	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in

accordance with workplace requirements

3.4 Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

3.6 Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS38 Install and maintain public lighting systems in remote communities.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRC003 Install and maintain public lighting systems in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- verifying public lighting system has been isolated and earthed/short circuited in accordance with work plan and workplace requirements
- installing and maintaining public lighting systems on poles or columns, including at least one (1) of the following:
  - wood
  - concrete
  - steel
  - composite
- installing lanterns/luminaires, including at least two (2) of the following:
  - high pressure mercury vapour
  - low pressure and high-pressure sodium vapour
  - fluorescent
  - quartz-halogen
  - light-emitting diode (LED)
- restoring supply to public lighting system in accordance with workplace requirements
- testing public lighting system connections, including all the following:
  - continuity test
  - voltage test
  - neutral loop impedance
  - insulation resistance

- undertaking maintenance of public lighting lanterns/luminaires, including at least two (2) of the following:
  - removing
  - repairing
  - replacing
  - cleaning
- working from at least one (1) of the following:
  - elevated work platform (EWP)
  - platform
  - ladder
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of work permits
- types of lighting systems for overhead and underground, including:
  - wood, concrete, steel and composite poles
  - public lighting brackets
  - associated hardware
- safety precautions specific to working on public lighting, including:
  - safe working practices and procedures
  - working at heights
  - permit to work systems
  - isolation procedures
- basic public lighting principles, including:
  - electromagnetic spectrum
  - principles of colour
  - behaviour of light
  - factors that affect illumination
- requirements for the use of workplace construction manuals, systems, diagrams, plans and drawings, including:

    - public light construction
    - public lighting circuits
    - earthing systems
- types of tools, equipment and specialised testing equipment
- types and function of lanterns/luminaries/lamps and control equipment, including:
    - high-pressure mercury vapour
    - low pressure and high-pressure sodium vapour
    - fluorescent
    - quartz-halogen
    - choke boxes
    - photo-electric cells
    - time switches
    - contactor boxes
    - LED
- techniques for the installation of public lighting systems
- techniques for the inspection, testing and commissioning of public lighting systems, including:
    - pre-energisation tests, including continuity and insulation resistance
    - use of specialist testing equipment
    - neutral and phase identification
    - neutral integrity
    - testing and commissioning forms and documentation
- application of specialist testing equipment, including:
    - voltage detectors
    - insulation resistance testers
    - clamp-on ammeters
    - continuity testers
    - fault indictors
- techniques for the maintenance of public lighting systems, including:
    - diagnosing faults
    - removal, repair, replacement and cleaning of public lighting and hardware
    - controlling and switching of public lighting systems
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used for installing and maintaining public lighting systems in a very remote community
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRC004 Install and replace energy meters and associated equipment in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and replace whole current energy meters and associated equipment in a very remote community in the electricity supply industry (ESI).

It includes the testing of whole current energy meters and associated equipment to identify faults and establish normal functions of energy meters and associated equipment.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRC006 Perform low voltage electricity network switching in a very remote community

UETDRRC007 Solve problems in electrical network apparatus in a very remote community

UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

Competency Field

Remote Community

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and replace energy meters and associated equipment	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.7 Electrical network circuit is confirmed as being isolated and earthed/short circuited in accordance with workplace requirements
	1.8 Work permits are received and signed in accordance with workplace requirements
	1.9 Worksite is prepared in accordance with work plan and workplace requirements
2 Carry out the installation or replacement of energy meters and associated equipment	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, climbing, working at heights, the use of plant, tools, equipment and PPE are carried out in accordance

		with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Installation or replacement of whole current energy meters is carried out in accordance with workplace requirements
	2.5	Earthing/short circuiting equipment is removed, permit signed off and electrical network circuits re-energised in accordance with workplace requirements
	2.6	Whole current energy meters and associated equipment are tested in accordance with workplace requirements
	2.7	Whole current energy meters and associated equipment are programmed and sealed in accordance with workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS34 Install and replace energy meters and associated equipment in remote communities.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRC004 Install and replace energy meters and associated equipment in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- preparing to enter the workplace including the use of work permits, clearances and isolation permissions
- confirming electrical network circuits have been isolated and earthed/short circuited in accordance with work plan and workplace requirements
- installing or replacing at least one (1) of the following whole current energy meters:
  - induction disk energy meter
  - electronic energy meter
  - electronic summator
- installing at least two (2) of the following associated metering equipment:
  - service fuses
  - service links
  - meter panels
  - controlled output meters
- re-energising electrical network circuits in accordance with workplace requirements
- completing at least three (3) of the following tests of whole current energy meters:
  - polarity*
  - continuity
  - insulation resistance
  - meter functionality (load)
  - neutral integrity
  - phase sequence (rotation)

    - voltage
    - (*must do)
- working from at least one (1) of the following:
    - elevated work platform (EWP)
    - platform
    - ladder
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reporting and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
    - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- whole current energy meters, including:
    - construction
    - operation
    - error codes
- associated metering equipment, including:
    - construction
    - operation
- metering arrangements, including:
    - direct
    - distributed master
    - multiple master
    - plug-in
    - multiple earth neutral (MEN) system
- cable types and applications
- installation tools, equipment and testing devices
- installation and removal of energy meters, including:
    - stripping cable
    - cable terminations
    - meter wiring positions
    - service protection device (SPD)

    - meter boards
- testing procedures, including:
    - continuity
    - insulation resistance
    - polarity
    - phase sequence
    - neutral integrity
    - meter functionality
- procedures for recording energy meter documentation
- customer education on energy meters
- techniques for the maintenance of energy metering, including:
    - fault finding
    - fault rectification
    - meter reading
    - tariff changes
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and replacing whole current energy meters and associated equipment in a very remote community
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRC005 Maintain, test and verify power systems in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to maintain, test and verify power systems and associated hardware in very remote communities in the electricity supply industry (ESI).

It includes working safely, isolating, maintaining and restoring generation power systems, solving problems on distribution electrical network circuits and apparatus, and completing functional testing.

It also includes using specialist tools, equipment, personal protective equipment (PPE), visual inspections, identifying non-compliance defects, the use of work permits and authorisation protocols.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0007 Conduct periodic maintenance of remote area power supply generator sets

UEERE0018 Maintain and repair remote area power generation facilities

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEERE0023 Work safely with remote area power supply systems

UEERE0041 Maintain operation of remote area power generation plant

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRC006 Perform low voltage electricity network switching in a very remote community

UETDRRC007 Solve problems in electrical network apparatus in a very remote community

UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

Competency Field

Remote Community

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain, test and verify power systems	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are identified and obtained in accordance with work plan and workplace requirements
	1.4 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work permits are received and signed in accordance with workplace requirements
	1.7 Switching/isolation schedule is developed in accordance with work plan and workplace requirements
	1.8 Plant, tools, equipment and PPE required for work are

		determined, obtained and confirmed in working order
	1.9	Specialist test equipment is obtained, confirmed in working order and calibrated in accordance with workplace requirements
	1.10	Worksite is prepared in accordance with work plan and workplace requirements
2 Carry out maintenance, testing and verification of generation power systems	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Generation power system switching/isolation authorisation is obtained in accordance with switching/isolation schedule and workplace requirements
	2.5	Generation power systems are isolated, proved de-energised and earthed in accordance with switching/isolation schedule and workplace requirements
	2.6	Generation power systems equipment and associated hardware is maintained in accordance with work plan and workplace requirements
	2.7	Generation power systems equipment and associated hardware are visually inspected to confirm compliance in accordance with work plan and workplace requirements
	2.8	Generation power system authorisation is obtained to commence restoration in accordance with switching/isolation schedule and workplace requirements
	2.9	Generation power systems are tested and verified compliant in accordance with work plan, work permits and workplace requirements
	2.10	Incidents or unplanned events are responded to in

		accordance with workplace requirements
	2.11	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Solve electrical network apparatus and network circuit problems	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Live testing or measuring requirements are determined in accordance with workplace requirements
	3.5	Electrical network apparatus and network circuits are confirmed as isolated and earthed/short circuited in accordance with workplace requirements
	3.6	Operating parameters of the circuit within the electrical network apparatus are verified in accordance with workplace requirements
	3.7	Operating parameters of the network electrical circuits are verified in accordance with workplace requirements
	3.8	Established methodical processes are used to identify electrical problems from measured and calculated values in accordance with workplace requirements
	3.9	Electrical network apparatus circuit problems are solved without damage to apparatus or circuits to comply with workplace requirements
	3.10	Electrical network circuit problems are solved without damage to apparatus or circuits to comply with workplace requirements
	3.11	Earthing/short circuiting equipment is removed, permit signed off and electrical network apparatus and network circuits re-energised in accordance with workplace requirements
	3.12	Electrical network apparatus and network circuits are tested to determine correct operation in accordance with

		workplace requirements
	3.13	Incidents or unplanned events are responded to in accordance with workplace requirements
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.6	Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is not equivalent to UETTDRIS99 Test and Verify Distribution Remote Area Installations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRC005 Maintain, test and verify power systems in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- preparing, issuing and signing on and off relevant work permits in accordance with workplace requirements
- isolating and restoring generation power systems, including:
  - identifying isolation points
  - preparing a generation isolation and restoration permit to work schedule
  - obtaining authorisation to isolate and restore generation power systems
  - isolating and restoring generation power systems in accordance with switching/isolation schedule
- maintaining generation power system, including:
  - conducting routine safety inspections
  - inspecting generation power system facilities
  - carrying out scheduled generator engine service
  - checking generation power system fuel facilities
  - conducting generation power station operational readings
- testing and maintaining generation power systems, including:
  - electrical equipment and switchgear
  - electrical earthing systems
  - identifying non-compliance
  - rectifying non-compliance or defects
  - completing testing documentation
- confirming network apparatus and network electrical circuits are isolated
- determining the operating parameters of a circuit within the electrical network apparatus
- using established methodical processes to solve electrical problems in accordance with

workplace requirements, including:

- choosing correct instruments and ranges for testing and measuring values
- connecting instruments to measure and calculate values in electrical network apparatus and network circuits

- identifying electrical network apparatus and network circuits problems, including at least three (3) of the following:
  - high (HV)/low voltage (LV)
  - high resistance
  - low resistance
  - fault current (fuses)
  - kilowatt hour meter faults (no supply, reverse polarity etc)
  - public lighting faults
- working from at least one (1) of the following:
  - elevated work platform (EWP)
  - platform
  - ladder
- connecting and testing electrical network apparatus and network circuits to determine correct operation
- removing earthing/short circuiting equipment and re-energising electrical network apparatus and network circuits in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - environmental
  - wiring rules requirements – continuity test and insulation resistance test
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- types, purpose and application of work permits
- organisational workplace requirements, including:
  - generation power systems
  - electrical safety
  - isolation and restoration switching schedules
- generation power systems, including:

  - balance of plant
  - piping and instrument diagrams
  - control and switch rooms
  - electrical switchgear
  - electrical protection
- generation power system isolation and restoration, including:
  - generation permit to work
  - lock out, tag out (LOTO)
  - authorisations
- generation power system testing, including:
  - electricity network voltages
  - commissioning
- safe use, care and storage of electrical instruments
- fault loop impedance, including:
  - term fault loop impedance of an alternating current (a.c.) power system
  - measuring fault loop impedance of typical circuits
  - procedures for testing fault loop impedance
- single phase systems
- multi-phase systems
- impedance in a.c. circuits
- documentation and reports, including:
  - work records
  - tests and commissions
  - incidents and unplanned events
  - periodic inspections
  - non-compliance and defects
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used for maintaining, testing and verifying generation power systems, network apparatus and network electrical circuits in a very remote community
- applicable documentation, including workplace requirements, network construction standards, network supply standards, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRC006 Perform low voltage electricity network switching in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to perform low voltage (LV) electricity network switching in a very remote community in the electricity supply industry (ESI).

It includes preparing a switching schedule, isolating and restoring LV overhead and underground electricity networks to a given switching schedule using LV circuit breaking and isolation devices.

It also includes paralleling LV electrical network circuits, using specialist tools, personal protective equipment (PPE), earthing and testing equipment, and the use of work permits and authorisation protocols.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Remote Community

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to perform LV electricity network switching	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Hazards are identified, risks assessed and control measures identified and applied
	1.4 Plant, tools, equipment and PPE required for work are determined, obtained and confirmed in working order
	1.5 Switching schedule is developed in accordance with work plan and workplace requirements
	1.6 LV network switching is prioritised for completion in accordance with workplace requirements
	1.7 LV network switching schedule is communicated with relevant personnel in accordance with workplace requirements
2 Perform isolation of LV electricity network	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Authorisation is obtained to commence LV electricity network switching in accordance with switching schedule and workplace requirements
	2.3 Lifting, climbing, working at heights and the use of plant, tools and equipment are carried out in accordance with workplace requirements
	2.4 Hazard control measures are monitored in accordance with workplace requirements
	2.5 LV electricity network is isolated in accordance with switching schedule
	2.6 Communications are maintained with authorisation authority in accordance with workplace requirements

	2.7	LV electricity network is tested to confirm de-energised and earthed/short circuited in accordance with switching schedule and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Work permits are received and signed in accordance with workplace requirements
	2.10	Authorisation authority is notified isolation is completed in accordance with switching schedule and workplace requirements
3 Perform restoration of LV electricity network	**3.1**	Work permits are signed off in accordance with switching schedule and workplace requirements
	3.2	Authorisation is obtained to commence restoration of LV electricity network in accordance with workplace requirements
	3.3	Lifting, climbing, working at heights and the use of plant, tools and equipment, are carried out in accordance with workplace requirements
	3.4	Restore LV electricity network in accordance with switching schedule
	3.5	Authorisation authority is notified restoration is completed in accordance with switching schedule and workplace requirements
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.5	Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS35 Perform remote community network field switching to a given schedule.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRC006 Perform low voltage electricity network switching in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - relevant work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- preparing a low voltage (LV) electricity network switching schedule in accordance with workplace requirements
- obtaining authorisation to perform LV electricity network switching
- isolating and restoring LV electricity networks in accordance with switching schedule requirements
- undertaking tests of LV electricity network, including:
  - voltage
  - phase sequence (rotation)
  - polarity
- operating LV switchgear, including at least one (1) of the following:
  - LV circuit breaker
  - LV links
  - LV fuses
- working from at least one (1) of the following:
  - elevated work platform (EWP)
  - ladder
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- requirements for the use of manuals, system diagrams/plans and drawings, including:
  - types, characteristics and capabilities of electrical apparatus
  - use, characteristics and capabilities of specialised tools and testing equipment
  - restrictions pertaining to LV switching equipment
  - high voltage (HV) network interconnectors source of possible back-feed
- LV switchgear, including:
  - types
  - categories
  - application
  - function
  - operating capabilities
- types, characteristics and capabilities of LV specialised switching and testing equipment
- procedures for obtaining correct LV switching authorisation, including:
  - identification of hazards, assessing and controlling risks
  - safety procedures and precautions
  - safe approach distances
  - responsibilities and protocols
  - identifying switching resources
  - procedures for obtaining electrical access permits/authorities
  - requirements for team switching
  - procedures for coordination of operations
- techniques for overhead and underground LV electricity network switching, including:
  - isolation procedures
  - testing and earthing/short circuiting LV electrical apparatus
  - pre-switching checks
  - switching operational procedures
  - emergency fault procedures
  - restoration procedures
- role and responsibilities of the LV switching operator

- application, function and operating capabilities of switchgear
- preparation of a LV switching schedule, including:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; isolation points and earthing; and responsibilities of the switching operator
  - techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for performing LV electricity network switching in a very remote community
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRC007 Solve problems in electrical network apparatus in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to solve electrical network apparatus problems in a very remote community in the electricity supply industry (ESI).

It includes determining correct operation of network apparatus and related circuits, providing solutions as they apply to the electrical network and documenting problem-solving activities.

It also includes safe working practices, network apparatus problem-solving processes, including the use of voltage, current and resistance measuring devices, diagnosing and providing solutions derived from test analysis to solve problems in network apparatus and related circuits.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRC006 Perform low voltage electricity network switching in a very remote community

Competency Field

Remote Community

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to solve electrical network apparatus problems	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment, and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed, and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Work permits are received and signed in accordance with workplace requirements
	1.8 Worksite is prepared in accordance with the work plan and workplace requirements
	1.9 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Solve electrical network apparatus problems	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements

2.3 Hazard control measures are monitored in accordance with workplace requirements

2.4 Live testing or measuring requirements are determined in accordance with workplace requirements

2.5 Electrical network circuits are confirmed as isolated and earthed/short circuited in accordance with workplace requirements

2.6 Operating parameters of the circuit within the electrical network apparatus are verified in accordance with workplace requirements

2.7 Established methodical processes are used to identify electrical problems from measured and calculated values in accordance with workplace requirements

2.8 Electrical network apparatus circuit problems are solved without damage to apparatus or circuits to comply with workplace requirements

2.9 Earthing/short circuiting equipment is removed, permit signed off and electrical network circuits re-energised in accordance with workplace requirements

2.10 Electrical network apparatus is tested to determine correct operation in accordance with workplace requirements

2.11 Incidents or unplanned events are responded to in accordance with workplace requirements

2.12 Quality checks of work are undertaken in accordance with work plan and workplace requirements

3 Complete work and documentation

3.1 Completed work is checked for compliance against the work plan and workplace requirements

3.2 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements

3.3 Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.4 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

3.5 Incidents or unplanned events are reported in accordance with workplace requirements

3.6 Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS32 Solve electrical problems in remote community network apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRC007 Solve problems in electrical network apparatus in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- preparing to enter the workplace, including the use of work permits, clearances and isolation permissions
- confirming network electrical apparatus circuit is isolated
- determining the operating parameters of a circuit within the electrical network apparatus
- using established methodical processes to solve electrical problems in accordance with workplace requirements, including:
  - choosing correct instruments and ranges for testing and measuring values
  - connecting instruments to measure and calculate values in circuits within the electrical network apparatus
- identifying at least three (3) of the following problems:
  - high voltage (HV)/low voltage (LV)
  - high resistance
  - low resistance
  - fault current (fuses)
  - kilowatt hour meter faults (no supply, reverse polarity etc)
  - public lighting faults
- working from at least one (1) of the following:
  - elevated work platform (EWP)
  - platform
  - ladder
- connecting and testing electrical network apparatus to determine correct operation
- dealing with an unplanned event on at least one (1) occasion

- completing relevant work records, reporting and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - wiring rules requirements – continuity test and insulation resistance test
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- safe use, care and storage of electrical instruments
- parallel circuits, including:
  - schematic diagram of a single-source direct current (d.c.) parallel circuit
  - major components of a parallel circuit (power supply, loads, connecting leads and switch)
  - applications where parallel circuits are used in the remote community electricity supply industry (ESI)
  - characteristics of a parallel circuit (load connection, current paths, voltage drops, power dissipation, and effects of an open circuit in a parallel circuit)
  - relationship between currents entering a junction and currents leaving a junction
  - calculation of the total resistance of a parallel circuit
  - calculation of the total current of a parallel circuit
  - calculation of the total voltage of a parallel circuit
  - single-source d.c. parallel circuit set-up and connection
  - resistance, voltage and current measurements in a single-source parallel circuit
  - voltage, current, resistance or power dissipated from measured values of any of these quantities
- series/parallel circuits, including:
  - schematic diagram of a single-source d.c. series/parallel circuit
  - major components of a series/parallel circuit (power supply, loads, connecting leads and switch)
  - applications where series/parallel circuits are used in the remote community ESI
  - characteristics of a series/parallel circuit (load connection, current paths, voltage drops, power dissipation, and effects of an open circuit in a series/parallel circuit)
  - calculation of the total resistance of a series/parallel circuit
  - calculation of the total current of a series/parallel circuit
  - calculation of the total voltage and the individual voltage drops of a series/parallel circuit
  - setting up and connecting a single-source d.c. series/parallel circuit

  - resistance, voltage and current measurements in a single-source d.c. series/parallel circuit
  - voltage, current, resistances or power dissipated from measured values of any two of these quantities
- factors affecting resistance, including:
  - four factors that affect the resistance of a conductor (type of material, length, cross-sectional area and temperature)
  - affect the change in the type of material (resistivity) has on the resistance of a conductor
  - effect the change in length has on the resistance of a conductor
  - effect the change in cross-sectional area has on the resistance of a conductor
  - effects of temperature change on the resistance of various conducting materials
  - effects of resistance on the current-carrying capacity and voltage drop in cables
- effects of meters in a circuit, including:
  - meters in terms of units to be measured, range, loading effect, accuracy and safety category of meters for a given application
  - instruments used in the field to measure voltage and current, and the typical circumstances in which they are used
  - hazards involved in using electrical instruments and the safety control measures that should be taken
  - operating characteristics of analogue and digital meters
  - correct techniques to read the scale of an analogue meters and how to reduce the 'parallax' error
  - types of voltmeters used in the ESI – bench type, clamp meter and multimeter
  - purpose and characteristics (internal resistance, range, loading effect and accuracy) of a voltmeter
  - types of voltage indicator testers (e.g., light-emitting diode (LED), neon, solenoid, volt-stick and series tester) and the purpose of each voltage indicator tester
  - various types of ammeters used in the ESI (bench, clamp meter and multimeter)
  - purpose and characteristics of an ammeter and the correct connection (series) of an ammeter into a circuit
  - loading effect of various voltmeters when measuring voltage across various loads
- resistance measurement, including:
  - identification of instruments used in the field to measure resistance (including insulation resistance (IR)) and the typical circumstances in which they are used
  - purpose of an IR tester
  - parts and functions of various analogue and digital IR tester (selector range switch, zero ohms adjustment, battery check function, scale and connecting leads)
  - reasons why the supply must be isolated prior to using the IR tester
  - where and why the continuity test would be used in an ESI systems
  - where and why the insulation resistance test would be used in an ESI system
  - voltage ranges of an IR tester and where each range may be used. e.g. 250 V d.c, 500 V d.c & 1000 V d.c
  - IR tester calibration requirements

  - measurement of low values of resistance using an IR tester continuity functions
  - measurement of high values of resistance using an IR tester insulation resistance function
  - volt-ammeter (short shunt and long shunt) methods of measuring resistance
  - calculation of resistance values using voltmeter and ammeter reading (long and short shunt connections)
- capacitors and capacitance, including:
  - basic construction of standard capacitor, highlighting the plates, dielectric and connecting leads
  - types of dielectric material and each dielectric's relative permittivity
  - identification of various types of capacitors commonly used in the ESI
  - circuit symbol of various types of capacitors - standard; variable, trimmer and polarised
  - terms: capacitance (C), electric charge (Q) and energy (W)
  - unit of capacitance (Farad), electric charge (Coulomb) and energy (Joule)
  - factors affecting capacitance and how factors are present in all circuits to some extent
  - how a capacitor is charged in a d.c. circuit
  - behaviour of a series d.c. circuit containing resistance and capacitance components - charge and discharge curves
  - term: time constant and its relationship to the charging and discharging of a capacitor
  - calculation of quantities from given information - capacitance (Q = VC); energy (W =½CV2); voltage (V = Q/C)
  - connection of a series d.c. circuit containing capacitance and resistor to determine the time constant of the circuit
- capacitors, including:
  - hazards involved in working with capacitance effects and the safety control measures that should be taken
  - safe handling and the correct methods of discharging various size capacitors
  - dangers of a charged capacitor and the consequences of discharging a capacitor through a person
  - effects of capacitors connected in parallel
  - effects on the total capacitance of capacitors connected in series
  - common faults in capacitors
  - testing of capacitors to determine serviceability
  - application of capacitors in the ESI
- magnetism, including:
  - magnetic field pattern of bar and horse-shoe magnets
  - magnets attraction and repulsion when brought in contact with each other
  - common magnetic and non-magnetic materials and groupings (diamagnetic, paramagnetic and ferromagnetic materials)
  - principle of magnetic screening (shielding) and its applications
  - practical applications of magnets
- electromagnetism, including:

- conventions representing direction of current flow in a conductor
- magnetic field pattern around a single conductor and two adjacent conductors carrying current
- right hand rule to determine the direction of magnetic field around a current-carrying conductor
- direction of force between adjacent current-carrying conductors
- effect of current, length and distance apart on the force between conductors (including forces on bus bars during fault conditions)
- magnetic field around an electromagnet
- right hand rule to determine the direction of magnetic field around a current-carrying coil
- magnetomotive force (m.m.f.) and its relationship to the number of turns in a coil and the current flowing in the coil
- practical applications of electromagnets

- electromagnetic induction, including:
  - principle of electromagnetic induction (Faraday's law of electromagnetic induction)
  - Fleming's right hand rule to a current-carrying conductor under the influence of a magnetic field
  - calculation of induced electromagnetic force (e.m.f). in a conductor given the conductor length, flux density and velocity of the conductor
  - calculation of induced e.m.f. in a coil given the number of turns in a coil and the rate of change of flux
  - calculation of force on a conductor given the flux density of the magnetic field, length of the conductor and the current being carried by the conductor
  - Lenz's law
  - applications of electromagnetic induction
- inductance, including:
  - construction of an inductor, including a bifilar winding inductor
  - Australian Standard circuit diagram symbol for the four types of inductor
  - effect of physical parameters on the inductance of an inductor
  - common types of inductor cores
  - applications of the different types of inductors
  - definition of terms self-induction, inductance and mutual inductance
  - calculation of value of self-induced e.m.f. in a coil
  - mutual induction occurs between two coils
  - practical applications for the effects of self and mutual induction
  - undesirable effects of self and mutual induction
- magnetic devices, including:
  - construction, operation and applications of relays
  - construction, operation and applications of contactors
  - magnetic methods used to extinguish the arc between opening contacts
  - construction, operation and applications of Hall effect devices

- construction, operation and application of magnetic sensing devices
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for solving problems in electrical network apparatus in a very remote community
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to solve problems in low voltage (LV) electrical network circuits in a very remote community in the electricity supply industry (ESI).

It includes establishing correct operation of single and multi-phase LV electrical network circuits and solving circuit problems as they apply to servicing, fault-finding and installation work function.

It also includes safe working practices, issues related to fault protection, power factor and multiple earthed neutral (MEN) systems and the use of voltage, current and resistance measuring devices to provide solutions to LV electrical network circuit problems derived from calculated and measured parameters.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRC006 Perform low voltage electricity network switching in a very remote community

UETDRRC007 Solve problems in electrical network apparatus in a very remote community

Competency Field

Remote Community

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to solve problems in LV electrical network circuits	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment, and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Work permits are received and signed in accordance with workplace requirements
	1.8 Worksite is prepared in accordance with the work plan and workplace requirements
	1.9 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Solve problems in LV electrical network circuits	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements

	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Live testing or measuring requirements are determined in accordance with workplace requirements
	2.5	Electrical network circuits are confirmed as isolated and proved earthed/short circuited in accordance with workplace requirements
	2.6	Operating parameters of the network electrical circuits are verified in accordance with workplace requirements
	2.7	Established methodical processes are used to identify electrical network circuit problems from measured and calculated values in accordance with workplace requirements
	2.8	Electrical network circuit problems are solved without damage to apparatus or circuits to comply with workplace requirements
	2.9	Earthing/short circuiting equipment is removed, permit signed off and electrical network circuits re-energised in accordance with workplace requirements
	2.10	Electrical network circuits are tested to determine correct operation in accordance with workplace requirements
	2.11	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Worksite is rehabilitated, cleaned and made safe in accordance with workplace procedures
	3.3	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.4	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.5	Incidents or unplanned events are reported in accordance with workplace requirements
	3.6	Work records, reports and documentation are completed, and appropriate personnel notified in accordance with

workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS33 Solve electrical problems in remote community network systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- preparing to enter the workplace, including the use of work permits, clearances and isolation permissions
- confirming network electrical circuits are isolated
- determining the correct operation of the network electrical circuits
- using established methodical processes to solve electrical problems in accordance with workplace requirements, including:
  - choosing correct instruments and ranges for testing and measuring values
  - connecting instruments to measure and calculate values in circuits within the electrical network
- identifying circuit problems, including at least three (3) of the following:
  - high voltage (HV)/low voltage (LV)
  - high resistance
  - low resistance
  - fault current (fuses)
  - kilowatt hour meter faults (no supply, reverse polarity, etc)
  - streetlight faults
- connecting and testing network electrical circuits to determine correct operation
- working from at least one (1) of the following:
  - elevated work platform (EWP)
  - platform
  - ladder

- dealing with an unplanned event on at least (1) one occasion
- completing relevant work records, reporting and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - wiring rules requirements
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- alternating current (a.c.) quantities, including:
  - sine, cosine and tangent ratios of a right-angle triangle
  - Pythagoras theorem to a right-angle triangle
  - use of the cathode ray oscilloscope (CRO) to measure direct current (d.c.) and a.c. voltage levels
  - sinusoidal voltage generated by a single turn coil rotated in uniform magnetic fields
  - terms ‘period’, ‘maximum value’, ‘peak-to-peak value’, ‘instantaneous value’, ‘average value’, and ‘root-mean-square (r.m.s.) value’, in relation to a sinusoidal waveform
  - calculation of the instantaneous value of induced voltage of a generated sinusoidal waveform
  - measurement of instantaneous, peak and peak-to-peak values and the period of a sinusoidal waveform
  - calculation of r.m.s. value and frequency of a sinusoidal waveform from values of peak voltage and period
- phasor diagrams, including:
  - purpose of phasor diagrams
  - ‘in-phase’, ‘out-of-phase’, ‘phase angle’ ‘lead’ and ‘lag’
  - phase angle between two or more alternating quantities from a given sinusoidal waveform diagram
  - convention for representing voltage, current and the reference quantity in a phasor diagram
  - drawing phasor diagrams to show the relationship between two or more a.c. values of voltage and/or current
  - determination of phase relationship between two or more sinusoidal waveforms from a given diagram and measurements
- single element a.c. circuits, including:
  - setting up and connecting a single-source resistive a.c. circuit and taking voltage and current measurements to determine the resistance
  - determining the voltage, current resistances from the measurement of given values of any

two of these qualities
  - relationship between voltage drops and current in resistive a.c. circuits
  - applications of resistive a.c. circuits
  - defining 'inductive reactance'
  - calculation of inductive reactance for a given inductor and the relationship between inductive reactance and frequency
  - application of Ohm's law to determine voltage, current of inductive reactance in a purely inductive a.c. circuit given any two to these quantities
  - applications of inductive a.c circuits
  - calculation of capacitive reactance
  - application of Ohm's law to determine voltage, current or capacitive reactance in a purely capacitive a.c circuit given any two of the quantities
  - applications of capacitive a.c circuits
- impedance a.c. circuits, including:
  - impedance and impedance triangle
  - effects of impedance on the neutral and active conductor
  - determining the impedance, current and voltages for a series a.c circuit
  - drawing and labelling the impedance triangle for a series resistor–capacitor (RC) circuit
  - capacitive components in power circuits and systems and the effect on the phase relationship between voltage and current
  - drawing the equivalent circuit of a practical inductor
  - inductive components in power circuits and systems and their effect on the phase relationship between voltage and current
- power in an a.c. circuit, including:
  - difference between true power, apparent power and reactive power and the units in which these quantities are measured
  - power triangle to show the relationships between true power, apparent power and reactive power
  - terms: power factor and phase angle
  - methods used to measure single phase power, energy and demand
- power factor improvement, including:
  - effects of low power factor
  - requirements for power factor improvement
  - methods used to improve low power factor of an installation
  - local supply authority and wiring rules requirements regarding the power factor of an installation and power factor improvement equipment
- harmonics effect in a.c. systems, including:
  - term harmonic in relation to the sinusoidal waveform of an a.c. power system
  - sources in a.c. systems that produce harmonics
  - problems that may arise in a.c. circuits as a result of harmonics and how these are overcome

    - methods and test equipment used to test for harmonics
- multi-phase systems, including:
    - features of a multiphase system
    - two-phase systems (230 V/460 V)
    - comparison of voltages generated by single and multi-phase alternators
    - reasons for the adoption of three phases for power systems
    - how three phases are generated in a single alternator
    - calculation of root mean square (r.m.s.) value of voltage generated in each phase given the maximum value
    - relationship between the phase voltages generated in a multi-phase alternator and the conventions for identifying each
    - term phase sequence (also referred to as phase rotation)
    - phase sequence of a multi-phase supply
- single phase systems
- three phase star-connections, including:
    - connecting a three phase star-connection load
    - phase relationship between line and phase voltages and line and phase currents of a star-connected system
    - determining the r.m.s. value of line and phase voltage given any one of these quantities
    - determining the r.m.s. value of line and phase current given any one of these quantities
    - terms balanced load and unbalanced load
    - balanced and unbalanced loads in typical power systems
- three phase four wire systems, including:
    - purpose of the neutral conductor in three phase four wire systems
    - the effects of a high impedance in the neutral conductor of a three phase four wire system supplying an unbalanced load where multiple earthed neutral (MEN) earthing is employed
- three phase delta-connections and interconnected systems, including:
    - connecting three phase delta loads
    - phase relationship between line and phase voltages and line and phase currents of a delta-connected system
    - determining the r.m.s. value of line and phase voltage given any one of these quantities
    - determining the r.m.s. value of line and phase current given any one of these quantities
    - limitations and uses of open delta connections
    - loads in typical power systems
    - typical combinations of three phase interconnected systems using star-connections and a delta connection
    - relationship between line and phase voltages and line and phase currents in the typical interconnected systems using star-connections and delta connections
- fault loop impedance, including:
    - term fault loop impedance of an a.c. power system

    - measuring fault loop impedance of typical circuits
    - procedures for testing fault loop impedance
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for solving electrical problems in low voltage network circuits in a very remote community
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRF001 Perform cable pit/trench/excavation rescue

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the performance of cable pit/trench/excavation rescue procedures as they apply to live low voltage (LV) cable jointing in the workplace. It specifies the mandatory requirements of rescue from a cable pit/trench/excavation and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

HLTAID009 Provide cardiopulmonary resuscitation

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to perform cable pit/trench/excavation	**1.1** Instruction in hazards and risk control measures for specific work functions and work areas are identified

rescue		and obtained
	1.2	Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures
2 Carry out cable pit/trench/excavation rescue	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for accessing the cable pit/trench/excavation, and removing the victim, where necessary, from contact with live apparatus are followed
	2.3	Workplace procedures for removing the victim, where necessary, from the cable pit/trench/excavation are followed
	2.4	Workplace procedures for carrying out cardiopulmonary resuscitation (CPR), if required at the site, and treatment, where necessary, by medical professionals are followed
	2.5	The worksite is secured and entry controlled until appropriate authorities release the site
3 Complete the cable pit/trench/excavation rescue procedures	**3.1**	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF07 Perform cable pit/trench/excavation rescue.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRF001 Perform cable pit/trench/excavation rescue

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- inspecting and placing rescue equipment for a cable pit/trench/excavation rescue
- performing a rescue from a pit/trench/excavation in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- emergency procedures for the rescue of a victim from a cable pit/trench/excavation encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures, where appropriate
  - safe approach distances (SAD) appropriate to cable pit/trench/excavation rescue
  - involvement of external emergency services
- emergency procedures for the skills required for the rescue of a victim from a cable pit/trench/excavation encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to cable pit/trench/excavation rescue
  - removing victim to safe location/place of safety.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for performing cable pit/trench/excavation rescues
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRF002 Perform EWP rescue

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the performance of rescue procedures from an elevated work platform (EWP) in the workplace. It specifies the mandatory requirements of rescue from a raised EWP by a work party member on the ground and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

HLTAID009 Provide cardiopulmonary resuscitation

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to perform EWP	**1.1** Instruction in hazards and risk control measures for specific work areas and work activities are identified and

rescue procedures		obtained
	1.2	Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures
2 Carry out EWP rescue procedures	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for removing the victim, where necessary, from contact with or in vicinity of live apparatus and lowering the EWP to the ground are followed
	2.3	Workplace procedures for removing the victim from the EWP are followed
	2.4	Workplace procedures for carrying out cardiopulmonary resuscitation (CPR), if required at the site, and treatment, where necessary, by medical professionals are followed
	2.5	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete the EWP rescue procedure	**3.1**	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF03 Perform EWP rescue.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRF002 Perform EWP rescue

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- identifying operational instructions and confirming the function of emergency equipment to facilitate rescue from an incident on an elevated work platform (EWP)
- accessing controls and lowering the EWP in accordance with mobile equipment instructions/workplace procedures
- removing the victim from the EWP to the ground in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- emergency procedures for the EWP rescue of a victim encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures, where appropriate
  - safe approach distances (SAD) appropriate to EWP rescue
  - involvement of external emergency services
  - emergency retrieval systems
- emergency procedures required to undertake EWP rescue of a victim encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to EWP rescue
  - practical steps in rescuing a person
  - removing victim to safe location/place of safety.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for performing EWP rescue
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRF003 Perform pole top rescue

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the performance of pole top rescue procedures as an emergency procedure required in the workplace. It specifies the mandatory requirements of rescue from a pole top and how they apply in the context of transmission, distribution and rail work functions. It encompasses responsibilities for rescue, health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

HLTAID009 Provide cardiopulmonary resuscitation

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to perform pole top rescue	**1.1** Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained (This will include the risk assessment and

		control measures taken by the individual performing the rescue)
	1.2	Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures
2 Carry out pole top rescue	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for accessing the pole top and removing the victim, where necessary, from contact with live apparatus are followed
	2.3	Workplace procedures for attaching the emergency lowering equipment and lowering the victim to the ground are followed
	2.4	Workplace procedures for carrying out cardiopulmonary resuscitation (CPR), if required, at the site and treatment, where necessary, by medical professionals are followed
	2.5	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete the pole top rescue procedure	**3.1**	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF02 Perform pole top rescue.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRF003 Perform pole top rescue

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying work health and safety (WHS)/relevant occupational health and safety (OHS) requirements, including the use of risk control measures
- inspecting and placing rescue equipment
- performing pole top rescue in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- emergency procedures for the pole top rescue of a victim encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures, where appropriate
  - safe approach distances (SAD) appropriate to pole top rescue
  - involvement of external emergency services
- emergency procedures for the pole top rescue of a victim encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to pole top rescue
  - removing victim to safe location/place of safety.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for performing pole top rescue
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRF004 Perform rescue from a live LV panel

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the performance of rescue procedures from live low voltage (LV) apparatus, not including overhead lines and underground cables in the workplace. It specifies the mandatory requirements of rescue from a live LV panel and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

HLTAID009 Provide cardiopulmonary resuscitation

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to perform rescue procedures from live LV	**1.1** Instruction in hazards and risk control measures for specific work functions and work areas are identified

panel		and obtained
	1.2	Electricity isolation point is identified and labelled, where appropriate
	1.3	Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures
2 Carry out rescue from live LV panel	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for accessing and isolating the LV panel and removing the victim, where necessary, from contact with live apparatus are followed
	2.3	Workplace procedures for applying cardiopulmonary resuscitation (CPR), if required at the site, and gaining access to treatment by a medical professional, if necessary, are followed
	2.4	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete the LV panel rescue procedure	**3.1**	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF06 Perform rescue from a live LV panel.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRF004 Perform rescue from a live LV panel

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- inspecting and placing rescue equipment
- identifying and labelling the isolation point
- performing a rescue from a low voltage (LV) panel in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- emergency procedures for the rescue of a victim from a live LV panel encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures, where appropriate
  - safe approach distances SAD appropriate to rescue from a live LV panel
  - involvement of external emergency services
- emergency procedures required for the rescue of a victim from a live LV panel encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to rescue from a live LV panel
  - removing victim to safe location/place of safety.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for performing rescues from a live LV panel
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRF005 Perform rescue from switchyard structures at heights

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the performance of rescue procedures from switchyard structures at heights in the workplace. It specifies the mandatory requirements of rescue from switchyard structures and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

HLTAID009 Provide cardiopulmonary resuscitation

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to perform rescue	**1.1** Instruction in hazards and risk control measures for

from switchyard structures at heights		specific work areas and work activities are identified and obtained
	1.2	Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures
2 Carry out rescue from switchyard structures at heights	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for accessing the switchyard structure, and removing the victim, where necessary, from contact with live apparatus are followed
	2.3	Workplace procedures for attaching the emergency lowering equipment and lowering the victim to the ground are followed
	2.4	Workplace procedures for carrying out cardiopulmonary resuscitation (CPR) if required at the site, and treatment, where necessary, by medical professionals are followed
	2.5	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete rescue procedures from switchyard structures at heights	**3.1**	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF05 Perform rescue from switchyard structures at heights.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRF005 Perform rescue from switchyard structures at heights

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- inspecting and placing emergency rescue equipment
- performing a rescue from switchyard structures in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- emergency procedures for the rescue of a victim from switchyard structures at heights encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures, where appropriate
  - safe approach distances SAD appropriate to rescue from switchyard structures at heights
  - involvement of external emergency services
- emergency procedures required for the rescue of a victim from switchyard structures at heights encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to rescue from switchyard structures at heights
  - steps to rescuing a person
  - removing victim to safe location/place of safety.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for performing rescues from switchyard structures at heights
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRF006 Perform tower rescue

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the performance of rescue procedures from an electricity supply industry (ESI) tower in the workplace. It specifies the mandatory requirements of rescue from an ESI tower and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

HLTAID009 Provide cardiopulmonary resuscitation

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to perform tower rescue	**1.1** Instruction in hazards and risk control measures for specific work areas and work activities are identified and

		obtained
	1.2	Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures
2 Carry out tower rescue	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for accessing the tower, removing the victim, where necessary, and from contact with live apparatus and are followed
	2.3	Workplace procedures for attaching the emergency lowering equipment and lowering the victim to the ground are followed
	2.4	Workplace procedures for carrying out cardiopulmonary resuscitation (CPR), if required at the site, and treatment, where necessary, by medical professionals are followed
	2.5	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete the performance of the tower rescue procedure	**3.1**	Processes for reporting to accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF04 Perform tower rescue.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRF006 Perform tower rescue

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- inspecting and placing rescue equipment
- performing tower rescue in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- emergency procedures for the tower rescue of a victim encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures where appropriate
  - safe approach distances SAD appropriate to tower rescue
  - involvement of external emergency services
- emergency procedures required for tower rescue of a victim encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to tower rescue
  - steps in rescuing a person
  - removing victim to safe location/place of safety.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for performing tower rescue
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRF007 Provide first aid in an ESI environment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the provision of first aid in an electricity supply industry (ESI) environment. It includes the recognition and provision of an initial response where first aid is required in emergency situations by providing essential first aid using basic life support measures according to established workplace first aid policies and procedures.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

HLTAID009 Provide cardiopulmonary resuscitation

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to provide first aid in an ESI environment	**1.1** Physical hazards and risks to personal and others' health and safety are identified according to established procedures

	1.2	The situation is assessed and actions required decided
	1.3	Assistance is sought from others, if required
2 Carry out the provision of first aid in an ESI environment	**2.1**	The victim's physical condition and visible vital signs are assessed
	2.2	First aid is provided to stabilise the victim's condition in accordance with recognised first aid procedures
	2.3	Available first aid equipment is used as appropriate
	2.4	Emergency services appropriate to the situation are notified
	2.5	Information about the victim's condition is conveyed accurately and clearly to emergency services personnel or health professionals
3 Complete provision of first aid in an ESI environment	**3.1**	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF10 Provide first aid in an ESI environment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRF007 Provide first aid in an ESI environment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- checking site for danger to self, victim and others
- completing the management of electrical burns plus one other of the following:
  - bites or stings
  - shock
  - bleeding
  - electrical shock
- monitoring and managing victim
- raising alarm with emergency services.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and include knowledge of:

- provision of first aid in an emergency situation encompassing:
  - assessing hazards to rescuer, victim and others
  - involvement of external emergency services
  - the treatment of electrical burns, shock, bites, stings, bleeding and electric shock
- skills required to provide first aid in an emergency situation encompassing:
  - controlling hazards to rescuer, victim and others
  - use of available first aid equipment and resources
  - injury management using first aid principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for providing first aid in an ESI environment
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT001 Install overhead rail traction configurations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install overhead rail traction configurations in the electricity supply industry (ESI).

It includes installation of overlaps, cross-overs, turnouts and crossing configurations by using safe working practices on or about the running line/track identifying and confirming road/rail management plans and electrical permits.

It includes inspecting and checking to confirm configurations have been correctly installed in accordance with design and is fit for service, updating installation data and relevant quality assurance documentation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT002 Install overhead traction components and equipment

UETDRRT004 Install traction overhead wiring systems

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for installation of overhead traction configurations	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Required design standards and construction plans are obtained
	1.3 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Worksite, road or rail management plan is prepared in accordance with workplace requirements
	1.8 Environmental constraints applicable to the work are identified and control measures applied
2 Perform installation of overhead traction configurations	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored

	2.2 Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Work permits are instructed and issued and where appropriate signed in accordance with workplace requirements
	2.5 Worksite, road or rail management plan is established in accordance with workplace requirements
	2.6 Electrical equipment and associated hardware are positioned, secured and terminated/connected in accordance with job and workplace requirements
	2.7 Overhead traction configurations are installed in agreed timeframes, to design standards and with a minimum of waste in accordance with workplace requirements
	2.8 Profiling is checked in accordance with workplace requirements
	2.9 Incidents or unplanned events are responded to in accordance with workplace requirements
	2.10 Quality checks of work are undertaken in accordance with workplace requirements to ensure fit for service
3 Complete work and documentation	**3.1** Completed work is checked against design standards, construction plans and drawings for compliance and anomalies reported in accordance with workplace requirements
	3.2 Incidents or unplanned events are reported in accordance with workplace requirements
	3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4 Plant, tools and equipment are cleaned, checked, and returned to storage in accordance with workplace requirements
	3.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

3.6 Work permits are completed and overhead traction configuration is fit for service in accordance with workplace requirements

3.7 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT25 Install overhead rail traction configurations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT001 Install overhead rail traction configurations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- installing at least three (3) of the following types of system configurations:
  - overlaps
  - cross-overs
  - turnout crossings
  - train/tram crossings
- operating from at least one (1) of the following types of mobile plant and height equipment:
  - elevated work platform (EWP)
  - ladder
  - mobile platform
- using equipment and tools required for installing overhead rail traction configurations, including:
  - cant gauge
  - height and stagger gauge
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:

  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- traction configuration design standards and construction plans, including:
  - types
  - purpose
  - assemblies
  - components
- installation of traction configurations, including:
  - installation methods
  - measurement of tolerances
  - recording of tolerances
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment, plant and PPE currently used in industry for installing overhead rail traction configurations
- applicable documentation, including workplace requirements, relevant design standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT002 Install overhead traction components and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install overhead traction components and equipment in the electricity supply industry (ESI).

It includes installing hardware whilst undertaking safe working practices on or about the running line/track, identifying and confirming road/rail management plans and electrical permits.

It also includes inspecting and checking to confirm equipment, components and hardware have been correctly installed in accordance with design, ensuring traction system is fit for service and updating installation data and relevant quality assurance documentation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for installation of overhead traction equipment or components	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Required design standards and construction plans are obtained
	1.3 Plant, tools, equipment, components and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Worksite, road or rail management plan is prepared in accordance with workplace requirements
	1.8 Environmental constraints applicable to the work are identified and control measures applied
2 Perform installation of overhead traction equipment or components	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with

		workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Work permits are instructed and issued and where appropriate signed in accordance with workplace requirements
	2.5	Worksite, road or rail management plan is established in accordance with workplace requirements
	2.6	Electrical components or equipment and associated hardware are positioned, secured and terminated or connected in accordance with job and workplace requirements
	2.7	Overhead traction equipment or components are installed within agreed timeframes, to design standards in accordance with job and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken, and anomalies recorded and adjusted in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked against design standards, construction plans and drawings for compliance and anomalies reported in accordance with workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked, and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are completed and overhead traction equipment or components are fit for service in accordance with workplace requirements

3.7 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT27 Install overhead traction components and equipment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT002 Install overhead traction components and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- installing at least two (2) of the following types of equipment:
  - fuse switches
  - dropout fuses
  - section insulators
  - neutral sections
  - switches/isolators
  - links
  - fuses
  - surge diverters
  - transformers
- installing at least five (5) of the following types of components:
  - cantilever hardware
  - insulators
  - head span
  - pull-offs
  - push-offs
  - registration fittings
  - steady span
  - tension regulators
  - cross spans
  - tramway support network

  - pendulum
  - rigid rail conductor
- installing at least two (2) of the following types of fittings:
  - preformed fittings
  - compression fittings
  - wedge fittings
  - bolted splices
  - fork collar sockets
  - conical splices
- installing at least three (3) of the following types of connecting components:
  - feeders (drops, cross track)
  - dissimilar conductors
  - lugs
  - bolted clamp
  - drapes/potential jumper
  - droppers
- using at least two (2) of the following required for installing overhead traction components and equipment:
  - voltage detectors
  - micrometer/gauge
  - tension wrench
  - dynamometer
  - specialised tools
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- types and purpose of overhead traction equipment, including:
  - switches/isolators
  - fuse switches

    - dropout fuses
    - links
    - section insulators
    - neutral sections
    - surge diverters
    - transformers
    - fuses
- types and purpose of overhead components, including:
    - cantilever hardware
    - droppers
    - span or bay components
    - portal hardware
    - head span hardware
    - section insulators
    - neutral sections
    - registration fittings
    - steady span
    - tension regulators
    - cross spans
    - low clearance components
- types of conductors used for overhead wiring, including:
    - copper hard-drawn
    - copper cadmium
    - copper tin-bearing
    - aluminium
    - steel
    - other alloyed conductors
    - rigid rail conductor
- types of traction wire support structures, including:
    - portals
    - cantilevers
    - twin track cantilevers
    - drop vertical
    - head spans
    - cross spans
    - pull-offs
    - push-offs
- types and purpose of ancillary equipment, including:
    - surge arresters

    - booster
    - auxiliary transformers
- methods for installing conductors, including:
    - preformed fittings
    - compression fittings
    - wedged fittings
    - bolted splices
    - lugs
    - bolted clamps
    - fork collar sockets
    - conical splices
- methods for installing components, including:
    - feeders (drops, cross track)
    - droppers
    - dissimilar conductors
    - jumpers
    - surge arresters
- use of plant and equipment for installation work, including:
    - elevated work platforms (EWP)
    - ladders
    - works trains
    - rail-mounted overhead wiring equipment/vehicles
    - road/rail height access machinery/vehicles
    - voltage detectors
    - micrometer/gauges
    - tension wrenches
    - dynamometers
    - other specialised tools
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic

and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, plant, equipment and PPE currently used in industry for installing overhead traction components and equipment
- applicable documentation, including workplace requirements, relevant design standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT003 Install rail traction bonds

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install rail traction bonds in the electricity supply industry (ESI).

It includes the preparation and installation of temporary and permanent traction bonds, bonding cables, bonding equipment and hardware whilst undertaking safe working practices on or about the running line/track, identifying and confirming road/rail management plans and electrical permits.

It also includes checks to confirm bonds, bonding cables, bonding equipment and hardware have been correctly installed in accordance with design, ensuring traction bonding is fit for service, and installation data and relevant quality assurance documentation is completed.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT002 Install overhead traction components and equipment

UETDRRT004 Install traction overhead wiring systems

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install traction bonds	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Required design standards and construction plans are obtained
	1.3 Plant, tools, equipment, conductors and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Worksite, road or rail management plan is prepared in accordance with workplace requirements
	1.8 Environmental constraints applicable to the work are identified and control measures applied
2 Perform installation of traction bonds	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to

		be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Work permits are instructed and issued and where appropriate signed in accordance with workplace requirements
	2.5	Worksite, road or rail management plan is established in accordance with workplace requirements
	2.6	Cable and surrounds, including rail and other surfaces, are prepared for jointing and terminating in accordance with workplace requirements
	2.7	Traction bonds and bonding cables are installed and tested in agreed timeframes, to design standards and with minimum waste in accordance with workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with workplace requirements to ensure fit for service
3 Complete work and documentation	**3.1**	Completed work is checked against design standards, construction plans and drawings for compliance and anomalies reported in accordance with workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked, and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are completed, and overhead traction

bonding is fit for service in accordance with workplace requirements

3.7 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT23 Install rail traction bonds.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT003 Install rail traction bonds

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- installing at least two (2) of the following types of connecting bond cables and components:
  - covered or bare aluminium bonds
  - copper bonds
  - steel bonds
  - steel rail
- using at least three (3) of the following types of equipment, tools and testers required for installing rail traction bonds:
  - bonding specific tools
  - crimping devices
  - thermal moulds
  - rail drill
  - bonding fittings
  - explosive power tools
  - meter or tester
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace

requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- traction bond and cables, including:
  - permanent bonding preparation and installation methods
  - applications for permanent bonding
  - components of permanent bonds
  - interface between traction and signalling circuits
- safe working procedures/practices when carrying out permanent bonding, including:
  - PPE
  - electrical and visual testing of the PPE
- installation of temporary traction bonds and cables, including:
  - types and purpose of tools and equipment
  - installation and removal methods
  - testing for electrical integrity of bonds and cables
- installation of permanent traction bonds and cables, including:
  - types and purposes of tools and equipment
  - installation and removal methods
  - testing for electrical integrity of bond, cables and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing rail traction bonds

- applicable documentation, including workplace requirements, relevant design standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT004 Install traction overhead wiring systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install traction overhead wiring systems in the electricity supply industry (ESI).

It includes installing associated conductors whilst undertaking safe working practices on or about the running line/track, identifying and confirming road/rail management plans and electrical permits.

It also includes inspecting and checking to confirm conductors and hardware have been correctly installed in accordance with design, ensuring traction system is fit for service and updating installation data and relevant quality assurance documentation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT002 Install overhead traction components and equipment

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install overhead traction wiring systems	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Required design standards and construction plans are obtained
	1.3 Plant, tools, equipment, conductors and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Worksite, road or rail management plan is prepared in accordance with workplace requirements
	1.8 Environmental constraints applicable to the work are identified and control measures applied
2 Installation of overhead traction wiring systems	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with

	workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Work permits are instructed and issued and where appropriate signed in accordance with workplace requirements
	2.5 Worksite, road or rail management plan is established in accordance with workplace requirements
	2.6 Overhead traction wiring systems, including cables, fittings, traction conductors and associated equipment, are installed in accordance with job and workplace requirements
	2.7 Overhead traction wiring systems is installed and completed in agreed timeframes, to design standards and with minimum waste in accordance with workplace requirements
	2.8 Profiling is checked in accordance with workplace requirements
	2.9 Incidents or unplanned events are responded to in accordance with workplace requirements
	2.10 Quality checks of work are undertaken in accordance with workplace requirements to ensure fit for service
3 Complete work and documentation	**3.1** Completed work is checked against design standards, construction plans and drawings for compliance and anomalies reported in accordance with workplace requirements
	3.2 Incidents or unplanned events are reported in accordance with workplace requirements
	3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4 Plant, tools and equipment are cleaned, checked, and returned to storage in accordance with workplace requirements
	3.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6 Work permits are completed, and overhead traction

equipment or components are fit for service in accordance with workplace requirements

3.7 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT21 Install traction overhead wiring systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT004 Install traction overhead wiring systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- installing at least four (4) of the following types of system equipment and fittings:
  - support structure
  - span
  - section insulator
  - neutral section
  - droppers
  - support equipment
  - tension regulators
  - stay/guy wire
  - tramway support network
- installing at least two (2) of the following traction conductors and cables:
  - contact/trolley*
  - catenary
  - feeder
  - midpoint anchor
  - earth conductor
  - return conductor
  - drape/potential jumper
  - (*must do)
- operating from at least one (1) of the following types of mobile plant and height equipment:
  - elevated work platform (EWP)

    - ladder
    - mobile platform
- using at least two (2) of the following equipment and tools required for overhead rail traction wiring systems:
    - tensioning equipment*
    - specialised tools
    - electrical testing equipment
    - geometry profiling equipment
    - (*must do)
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
    - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- methods for running wire systems or conductors
- electrical wiring system components, including:
    - earth wires
    - feeder wire
    - catenary wire
    - contact/trolley wire
    - return conductor
    - insulators
    - surge arresters
    - cantilevers
    - droppers
    - tensioning equipment
    - current collectors
    - tram support network
    - tram fittings
    - low clearance components
- types of electrical traction systems, including:

  - auto-tensioning
  - spring loaded tension
  - balance weight anchor (BWA)
  - fixed tension
- relationship of the components, apparatus and the conductors to the operation of the traction system
- effective current collection and wire interface
- effective registration in the traction power system
- methods of profiling overhead traction wire, including:
  - factors that impact on current collectors to achieve smooth current collector transitions and interfaces
- dynamic and static forces, including:
  - types that effect traction systems
  - techniques to minimise the adverse effects
- standards, codes, legislation, supply authority regulations and workplace requirements applicable to electrical traction
- electrical traction voltage and current circuit paths, including:
  - transmission and distribution voltages
  - traction supply system and voltages
  - return and stray current paths, including electrolysis
- relationship of sectioning, section insulator and overlaps/air gaps in a traction power system
- traction power system components, including:
  - function of transformer/rectifiers
  - configuration and purpose of traction overhead wiring systems
  - function of isolators/switches
  - function of the circuit breaker
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment, plant and PPE currently used in industry for installing traction overhead wiring systems
- applicable documentation, including workplace requirements, relevant design standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT005 Maintain energised d.c. traction overhead wiring system

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the maintenance and repair of energised direct current (d.c.) traction overhead wiring system through the use of insulated ladder and working bare hand or insulated stick.

It includes the verification of the site conditions and the potential hazards, the conformance with and calculation of mechanical loads, the selection of appropriate tools and equipment, and authorised work method. It includes the undertaking of work health and safety (WHS)/occupational health and safety (OHS) and safe working practices to ensure that correct procedures and precautions to working live in accordance with the work plan and enterprise requirements are followed.

It also includes the visual inspection and necessary checks to confirm that overhead wiring components and associated hardware are in a safe condition to test and/or return to service, the recommissioning tests of the components and associated hardware and the updating of system data/maintenance records.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Pathway 1

Qualified and authorised Rail Traction Lineworker

Pathway 2

BSBLDR414 Lead team effectiveness

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT001 Install overhead rail traction configurations

UETDRRT002 Install overhead traction components and equipment

UETDRRT003 Install rail traction bonds

UETDRRT004 Install traction overhead wiring systems

UETDRRT008 Maintain overhead rail traction configurations

UETDRRT009 Maintain overhead traction components and equipment

UETDRRT011 Maintain traction overhead wiring systems

UETDRRT012 Operate rail road height access plant near rail traction systems

UETDRRT014 Test and verify rail traction installations

UETTDRIS65 Contribute to coordinated HV live working

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to maintain energised d.c. traction overhead wiring systems	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work

determined for planning and coordination

1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures

1.3 Risk control measures are identified, prioritised and evaluated against the work schedule

1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures

1.6 Relevant work authority/instructions are secured to coordinate the performance of work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order

1.8 Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures

	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out maintenance of energised d.c. traction overhead wiring systems	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working aloft, and use of tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Maintenance of energised d.c. traction overhead wiring systems is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe maintenance of energised d.c. traction overhead wiring systems to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the maintenance of energised d.c. traction	**3.1**	Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and

overhead wiring systems	solutions identified in accordance with established procedures
3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
3.5	Relevant work authorities/instructions are signed off or returned to client/customer in accordance with requirements
3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT31 Maintain energised d.c. traction overhead wiring system.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT005 Maintain energised d.c. traction overhead wiring system

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- maintaining, repairing or replacing components, including at least two (2) of the following:
  - span
  - cross-span
  - headspan
  - section insulator
  - support equipment
  - tramway support network
- maintaining traction components, including at least three (3) of the following:
  - catenary
  - dropper
  - contact/trolley
  - feeder/in-span feeder
  - drape/potential jumper
- performing at least two (2) of the following:
  - removal of trapped foreign objects
  - profiling
  - vertical adjustment of contact or trolley wire
- performing work from at least one (1) of the following:
  - insulated elevating work vehicles
  - insulated ladder
  - insulated work platforms
- using materials and equipment, including at least two (2) of the following:
  - tensioning equipment

- insulated sticks
- ropes
- slings and chains
- geometry profiling equipment

- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- basic rigging techniques encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with rigging, including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safe use of rigging equipment, tools and associated equipment - types, techniques and application
  - site inspection procedures - identifying hazards, assessing and controlling risks, and appropriate sequence of loading and unloading
  - determining the mass and dimensions of load
  - selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan); ratings of wire ropes and slings; removing, repairing and replacing of damage parts
  - techniques for assembling and erecting power winches and capstans
  - checking the integrity of support structure -visual inspection of load connections
  - techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth/state/territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, and load stability
- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length
  - construction types and structures for distribution and sub-transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors - types of low voltage (LV) and high voltage (HV) overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation - types and application of tools, equipment and

hardware
    - methods of stringing, tensioning and termination of LV and HV conductors
- safe working practices and procedures for the installation of overhead distribution conductors encompassing:
    - limits of approach for personnel, vehicles, mobile plant and elevated work platforms (EWPs)
    - requirements of persons prior to making bare hand contact with dead LV mains and apparatus
    - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
    - safe working practices - requirements to enable safe working on conductive poles, procedures to attach an on-site earthing device to de-energised LV and HV overhead circuit
- safe working on energised LV equipment encompassing:
    - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
    - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
    - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- powerline safety practices encompassing:
    - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
    - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from overhead conductors
    - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedures of climbing an overhead structure and fitting a pole chair
    - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, the procedure used to provide an effective traffic management scheme and the use of a two-way radio
    - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
    - rescue victims from heights and confined spaces - planning and identifying procedures,

establishing responses; developing techniques; involvement of external emergency services; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)

- requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work

- LV switching principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed
  - LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permits, operational procedures and earthing procedures
  - PPE for LV switching
- safe working on energised d.c. traction equipment encompassing:
  - Commonwealth/state/territory/local government legislation, standards, codes, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on energised LV d.c. traction overhead conductors and cables - safe approach distances; safe working practices, instructions and procedures; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessment and control of WHS/OHS risks; types, selection, maintenance, storage and use of PPE; dangers of working in confined spaces and at heights; notification to work systems, safe working policies, procedures and practices when using/operating specialised equipment and tools; and emergency response and rescue, including first aid
  - techniques in installation, maintenance, replacing and repairing of energised d.c. traction overhead conductors, cables and equipment - span, cross-span, head-span, section insulator, support equipment, tramway support network, catenary, dropper, contact/trolley, feeder/in-span feeder and drape/potential jumper
  - techniques in carrying out work on energised d.c. traction overhead conductors, cables and equipment - removing trapped foreign objects, profiling and vertical adjustment of contact or trolley wire
  - techniques in using plant, equipment and/or tools to carry out work on energised d.c. traction overhead conductors, cables and equipment - insulated elevating work vehicles; insulated ladder; insulated work platforms; tensioning equipment; and insulated sticks, ropes, slings and chains
- enterprise-specific policies and procedure instructions encompassing:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations

  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawings and documents encompassing:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT006 Maintain energised traction overhead electrical apparatus using glove techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the maintenance and repair of energised traction overhead electrical apparatus via the use of approved live line glove and barrier techniques.

It includes the verification of site conditions and the potential hazards, the conformance with and calculation of physical loads, the selection of appropriate tools and equipment, and authorised work methods. It encompasses the undertaking of correct procedures and precautions to working live line in accordance with the work plan and enterprise requirements.

It also includes the visual inspection and necessary checks to confirm that the electrical apparatus and components are in a safe condition to test and/or return to service, and the recommissioning tests of the electrical apparatus and components.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Pathway 1

Qualified and authorised Rail Traction Lineworker

Pathway 2

BSBLDR414 Lead team effectiveness

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT001 Install overhead rail traction configurations

UETDRRT002 Install overhead traction components and equipment

UETDRRT003 Install rail traction bonds

UETDRRT004 Install traction overhead wiring systems

UETDRRT005 Maintain energised d.c. traction overhead wiring system

UETDRRT008 Maintain overhead rail traction configurations

UETDRRT009 Maintain overhead traction components and equipment

UETDRRT011 Maintain traction overhead wiring systems

UETDRRT012 Operate rail road height access plant near rail traction systems

UETDRRT014 Test and verify rail traction installations

UETTDRIS65 Contribute to coordinated HV live working

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to maintain energised traction overhead electrical apparatus (glove)	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination

1.2 Calculation of physical loads and authorised work methods are obtained and relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures

1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures

1.5 Hazards associated with the work are identified and risk control measures implemented, including the rendering inoperative of automatic reclosing device

1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order

1.8 Relevant personnel at worksite are confirmed current in first aid, cardiopulmonary resuscitation (CPR), pole top and other rescue procedures according to requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established

		procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the maintenance of energised traction overhead electrical apparatus (glove)	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, CPR, pole top, other rescue procedures and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, and working aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Auto-reclose devices associated with the circuits being worked on are rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements
	2.5	Essential knowledge and associated skills are applied in the safe maintenance of energised traction overhead electrical apparatus to ensure completion within an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.6	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.7	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.8	Solutions to non-routine problems are identified and actioned in the maintenance of energised traction overhead electrical apparatus using acquired essential knowledge and associated skills according to requirements and established procedures
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for

		the client/customer and to a community/industry standard
3 Complete the maintenance of energised traction overhead electrical apparatus (glove)	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work documentation is signed off and traction overhead electrical apparatus returned to service, including returning of auto-reclosing device to normal, and client/customer advised in accordance with requirements
	3.6	Work completion records, reports, as installed//modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT33 Maintain energised traction overhead electrical apparatus using glove techniques.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT006 Maintain energised traction overhead electrical apparatus using glove techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- operating from at least one (1) of the following:
  - elevated work platform (EWP)
  - insulated ladder
  - insulated mobile platform
- using at least two (2) of the following:
  - specialised tools
  - insulated gloves and barriers
  - tensioning equipment
  - geometry profiling equipment
- using at least two (2) of the following:
  - air-break switches
  - insulators
  - surge arrestors
  - hardware and fittings
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- working on energised lines to 33 kV using live line glove and barrier techniques encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on energised lines to 33 kV

(poles) using live line glove and barrier techniques

- safety precautions working on energised lines to 33 kV using live line high voltage (HV) rubber gloving techniques - live line minimum approach distances of persons and plant; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); live line access authority/permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices; checking integrity of insulation prior to work commencement; types and function of specialised live line working equipment and tools inspection before use; safe working policies, procedures and practices when using/operating specialised equipment and tools; methods of using specialised equipment and tools; work team communication; use of safety observers; and emergency response and rescue, including first aid
- policies and procedures dealing with general work practices - definitions of terms used, responsibilities of personnel, types of structures from which glove and barrier methods can be performed, types of equipment and their compliance with relevant standards
- relationship between combined glove and barrier and stick methods - conditions under which they can be practiced
- techniques in installing and/or replacing HV insulators when working live line glove and barrier - intermediate insulators, angle insulators, bridging insulators, strain insulators and suspension insulators
- techniques in erecting and/or replacing HV cross-arms when working live line glove and barrier - intermediate, angle, strain, termination and suspension
- techniques in connecting and/or disconnecting HV bridges connections when working live line glove and barrier - strain/Tee bridges, bypass bridges/connections, HV ABC and similar/dissimilar metals
- techniques in the installation and/or maintenance of electrical equipment - air-break switches, gas switches, fuse assemblies, isolators, bird covers, surge diverters and fault indicators
- techniques in erecting and/or removing temporary midspan switching devices
- techniques using live line glove and barrier to erect and/or replace of poles - intermediate, angle and strain
- techniques using live line glove and barrier for the repair and/or replacement of HV conductors/cables
- techniques in repairing and/or replacing HV armour rods and/or line guards
- conversion methods using live line glove and barrier of intermediate construction to strain construction

- working on energised lines to 33 kV (poles) using live line glove and barrier/hot-stick combined encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on energised lines to 33 kV (poles) using live line glove and barrier/hot-stick combined
  - safety precautions working on energised lines to 33 kV using live line glove and barrier/hot-stick combined - live line minimum approach distances of persons and plant; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE; live line access

authority/permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices; checking integrity of insulation prior to work commencement ;types and function of specialised live line working equipment and tools inspection before use; safe working policies, procedures and practices when using/operating specialised equipment and tools; methods of using specialised equipment; work team communication; use of safety observers; and emergency response and rescue, including first aid

- policies and procedures dealing with general work practices for both glove and barrier/hot-stick combined, - definitions of terms used, responsibilities of personnel, types of structures from which glove and barrier methods can be performed, and types of equipment and their compliance with relevant standards
- relationship between combined glove and barrier/ hot-stick methods - conditions under which they can be practiced
- techniques for installing and/or replacing HV insulators using glove and barrier/hot-stick combined - intermediate insulators, angle insulators, bridging insulators, strain insulators and suspension insulators
- techniques for erecting and/or replacing HV cross-arms using glove and barrier/hot-stick combined - intermediate and angle
- techniques for connecting and/or disconnecting HV bridges connections using glove and barrier/hot-stick combined - strain/Tee bridges, bypass bridges/connections, HV ABC and HV and similar/dissimilar metals
- techniques in the installation and/or maintenance of electrical equipment using hot-stick - air-break switches, gas switches, fuse assemblies, isolators, bird covers, surge diverters and fault indicators
- techniques in the erection and/or replacement of poles - intermediate/suspension, angle, strain and termination
- techniques in repairing and/or replacing HV armour rods and/or line guards and/or conversion methods of intermediate construction to strain in construction
- techniques in the repairing and replacing HV conductors/cables and the identification of equipment used
- techniques in installing and/or maintaining switching devices using glove and barrier

- plant, equipment and tools used for HV live line work encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with plant, equipment and tools used for HV live line work
  - safety precautions when working on plant, equipment and tools using hot-stick combined - safe working clearances; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE and authorisation to work systems
  - identification of plant, equipment and tools used for HV live line work – types, applications, construction, characteristics, limitations and safe working load
  - serviceability of plant, equipment and tools used for HV live line work - inspection procedures, testing procedures, maintenance procedures and storage procedures
  - relationship of live line work access authority/permit, disabling auto-reclose function and

ensuring correct functioning of fault current protective devices prior to live line work
- live line access authorities, disabling auto-reclose function and ensuring fault current protective devices prior to live line work
- conductor supports – methods, types of equipment, construction, characteristics and limitations
- techniques in selecting appropriate conductor support methods in accordance with requirements
- calculation of loads and wind loading on conductors
- effects of resultant forces when transferring conductor loads
- rigging procedures for conductor support equipment

- principles of HV encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on or near HV
  - electrical and electrostatic principles related to HV lines - relationship of current, voltage and resistance as related to transmission lines, relationship of phase voltage and respective line voltages
  - production of an electric field – units, effect of distance, potential of an object within the field and the effect of distances to the potential
  - HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, and performance of a failed disc insulator on the line and the system
  - determining the minimum allowable number of discs per string for each line voltage in the system before bare hand work is to proceed
  - techniques in detecting a failed disc in a string
  - techniques in using appropriate tools and equipment to test a string
  - methods of recording data
  - effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field, and effects of electrostatic induction on bare hand work
  - application of Faraday's cage - effects of a body, advantages, and description of the Faraday's cage used by bare-hand live-line workers
  - safety precautions working on or near HV electrical apparatus - safe approach distances from live line; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE, permit to work systems and isolation procedures
  - types and function of specialised live working equipment
  - safe working policies, procedures and practices when using and operating specialised equipment
  - methods of using specialised equipment
  - emergency response and rescue, including first aid
  - effects of lighting and switching surges on performance of string insulators - health effects to workers

- methods used to alleviate surges on transmission lines
- magnetic field - difference between magnetic fields and electrostatic fields; source of magnetic field; techniques in locating, measuring and analysing known sources of magnetic fields; reasons for monitoring magnetic field exposure and techniques used to monitor magnetic fields

- HV switching principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and network interconnectors source of possible back-feed
  - role of the HV switching operator
  - operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits; purpose and procedures for operational forms, access authorities and permits
  - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - types and categories of HV switchgear
  - application, function and operating capabilities of switchgear
  - restrictions pertaining to HV switching equipment
  - procedures for the isolation of HV transmission main and working earths
  - earthing HV electrical apparatus practices and procedures for access - purposes of operational and additional work part on-site earths, factors determining the location and effectiveness of operational earthing, acceptable industry procedures, PPE and HV switching techniques
  - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- HV fault switching principles encompassing:
  - primary causes, effects and types of HV electrical faults
  - HV protection devices - main components, types, categories, applications and functions
  - basic principle of operation of HV system protection devices
  - protection coordination and protection zoning
  - HV feeder auto-reclosing suppression – function and application
  - circuit condition requirements and switching considerations when paralleling and separating HV feeders
- HV distribution transformer principles encompassing:
  - operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer - cable combination switching practices, paralleling requirements, isolation and earthing

procedures for access, common distribution transformer and associated electrical apparatus faults
    - HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers
- HV single wire earth return (SWER) system encompassing:
    - application and function of SWER system components
    - circuit arrangement
    - principle of operation
    - hazards and procedures associated with faulty SWER earth systems
    - procedure to isolate, energise and commission SWER substations
- feeder automation system encompassing:
    - function of feeder automation system and the main components
    - operation procedure for a remote field device from a local control station
    - functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
    - SCADA system security interlocks and access restrictions
    - SCADA system operation when switching apparatus or retrieving data via a remote access device, such as remote access terminal (RAT), dial up voice annunciated system and local control station
    - function of the main components of a local/remote control system
    - operation of a field devices using SCADA systems via a RAT, dial up voice annunciated system and local control station
- safe working on energised HV alternating current (AC) and/or direct current (DC) traction equipment encompassing:
    - Commonwealth/state/territory/local government legislation, standards, codes, supply authority regulations and/or enterprise requirements
    - safety precautions specific to working on energised LV DC traction overhead conductors and cables - live line minimum approach distances; WHS/OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of PPE; live line permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices; checking integrity of insulation prior to work commencement; types and function of specialised live line working equipment and tools inspection before use; safe working practices when using specialised equipment and tools; methods of using specialised equipment; work team communication; use of safety observers; and emergency response and rescue, including first aid
    - techniques in the use of hot-sticks for the maintenance of energised traction overhead apparatus
    - techniques in the use of glove and barrier on energised traction overhead apparatus.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT007 Maintain energised traction overhead electrical apparatus using stick techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the maintenance and repair of energised traction overhead electrical apparatus via the use of approved live line insulated stick techniques.

It includes the verification of site conditions and the potential hazards, the conformance with and calculation of physical loads, the selection of appropriate tools and equipment, and authorised work methods. It encompasses the undertaking of correct procedures and precautions to working live line in accordance with the work plan and enterprise requirements.

It also includes the visual inspection and necessary checks to confirm that the electrical apparatus and components are in a safe condition to test and/or return to service, and the recommissioning tests of the electrical apparatus and components.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Pathway 1

Qualified and authorised Rail Traction Lineworker

Pathway 2

BSBLDR414 Lead team effectiveness

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT001 Install overhead rail traction configurations

UETDRRT002 Install overhead traction components and equipment

UETDRRT003 Install rail traction bonds

UETDRRT004 Install traction overhead wiring systems

UETDRRT005 Maintain energised d.c. traction overhead wiring system

UETDRRT008 Maintain overhead rail traction configurations

UETDRRT009 Maintain overhead traction components and equipment

UETDRRT011 Maintain traction overhead wiring systems

UETDRRT012 Operate rail road height access plant near rail traction systems

UETDRRT014 Test and verify rail traction installations

UETTDRIS65 Contribute to coordinated HV live working

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to maintain energised traction overhead electrical apparatus	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination

1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures

1.3 Calculation of physical loads and authorised work methods are obtained and relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.4 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures

1.5 Hazards associated with the work are identified and risk control measures implemented, including the rendering inoperative of automatic reclosing device

1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order

1.8 Relevant personnel at worksite are confirmed current in first aid, cardiopulmonary resuscitation (CPR), pole top and other rescue procedures according to requirements

1.9 Liaison and communication issues with others/ authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures

	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the maintenance of energised traction overhead electrical apparatus	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, CPR, pole top, other rescue procedures and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, and working aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Auto-reclose devices associated with the circuits being worked on are rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements
	2.5	Essential knowledge and associated skills are applied in the safe maintenance of energised traction overhead electrical apparatus to ensure completion within an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.6	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.7	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.8	Unplanned events in the maintenance of energised traction overhead electrical apparatus are managed within the scope of established procedures
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the maintenance	**3.1**	Work undertaken is checked against work schedule for

of energised traction overhead electrical apparatus		conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work documentation is signed off and traction overhead electrical apparatus returned to service, including returning of auto-reclosing device to normal, and client/customer advised in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT32 Maintain energised traction overhead electrical apparatus using stick techniques.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT007 Maintain energised traction overhead electrical apparatus using stick techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- maintaining, repairing or replacing components, including at least two (2) of the following:
  - support structures
  - span
  - section insulator
  - neutral section
  - midpoint anchor
  - support equipment
  - tension regulators
- maintaining traction components, including at least two (2) of the following:
  - catenary
  - dropper
  - contact feeder
- performing at least one (1) of the following:
  - insulated elevated work platform (EWP)
  - insulated ladder
  - insulated mobile platform
- performing work from at least two (2) of the following:
  - specialised insulated tools
  - insulated sticks
  - tensioning equipment
  - geometry profiling equipment
- using materials and equipment, including at least two (2) of the following:
  - air-break switches

  - insulators
  - surge arrestors
  - hardware and fittings
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- basic rigging techniques encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with rigging, including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safe use of rigging equipment, tools and associated equipment - types, techniques and application
  - site inspection procedures - identifying hazards, assessing and controlling risks, and appropriate sequence of loading and unloading
  - determining the mass and dimensions of load
  - selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan); ratings of wire ropes and slings; removing, repairing and replacing damaged parts
  - techniques for assembling and erecting power winches and capstans
  - checking the integrity of support structure - visual inspection of load connections
  - techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth/state/territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, and load stability
- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors - types of low voltage (LV) and high voltage (HV) overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation - types and application of tools, equipment and hardware

  - methods of stringing, tensioning and termination of LV and HV conductors
- safe working practices and procedures for the installation of overhead distribution conductors encompassing:
  - limits of approach for personnel, vehicles, mobile plant and EWP
  - requirements of persons prior to making bare hand contact with dead LV mains and apparatus
  - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
  - safe working practices - requirements to enable safe working on conductive poles, procedures to attach an on-site earthing device to de-energised LV and HV overhead circuit
- safe working on energised LV equipment encompassing:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards, assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
  - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors
- powerline safety practices encompassing:
  - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
  - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from overhead conductors
  - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedure of climbing an overhead structure and fitting a pole chair
  - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, the procedures used to provide an effective traffic management scheme and the use of a two-way radio
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; general fire prevention methods and the precautions for personal protection when fighting small fires
  - rescue victims from heights and confined spaces - planning and identifying procedures, establishing responses, developing techniques, involvement of external emergency services, and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock

victim, including cardiopulmonary resuscitation (CPR)
    - requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work
- LV switching principles encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed
    - LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permits, operational procedures and earthing procedures
    - PPE for LV switching
- safe working on energised direct current (d.c.) traction equipment encompassing:
    - Commonwealth/state/territory/local government legislation, standards, codes, supply authority regulations and/or enterprise requirements
    - safety precautions specific to working on energised LV d.c. traction overhead conductors and cables - safe approach distances; safe working practices, instructions and procedures; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessment and control of WHS/OHS risks; types, selection, maintenance, storage and use of PPE; dangers of working in confined spaces and at heights; notification to work systems; safe working policies, procedures and practices when using/operating specialised equipment and tools; and emergency response and rescue, including first aid
    - techniques in installation, maintenance, replacing and repairing of energised d.c. traction overhead conductors, cables and equipment - span, cross-span, head-span, section insulator, support equipment, tramway support network, catenary, dropper, contact/trolley, feeder/in-span feeder and drape/potential jumper
    - techniques in carrying out work on energised d.c. traction overhead conductors, cables and equipment - removing trapped foreign objects, profiling and vertical adjustment of contact or trolley wire
    - techniques in using plant, equipment and/or tools to carry out work on energised d.c. traction overhead conductors, cables and equipment - insulated elevating work vehicles; insulated ladders; insulated work platforms; tensioning equipment; and insulated sticks, ropes, slings and chains
- enterprise-specific policies and procedure instructions encompassing:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures
    - rules and regulations
    - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures

  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawings and documents encompassing:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT008 Maintain overhead rail traction configurations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to maintain overhead rail traction configurations in the electricity supply industry (ESI).

It includes repairing or adjusting overlaps, cross-overs, turnouts and crossings configurations, undertaking safe working practices on or about the running line/track, identifying and confirming road/rail management plans, and electrical permits.

It also includes inspecting, diagnosing faults of traction configurations ensuring they are fit for service within normal parameters, including updating of maintenance records.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT001 Install overhead rail traction configurations

UETDRRT002 Install overhead traction components and equipment

UETDRRT004 Install traction overhead wiring systems

UETDRRT009 Maintain overhead traction components and equipment

UETDRRT011 Maintain traction overhead wiring systems

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain overhead traction configurations	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Relevant maintenance documents are identified and obtained
	1.3 Plant, tools, equipment, conductors and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Worksite, road or rail management plan is prepared in accordance with workplace requirements
	1.8 Environmental constraints applicable to the work are identified and control measures applied

2 Perform maintenance of overhead traction configurations	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Work permits are instructed and issued and where appropriate signed in accordance with workplace requirements
	2.5 Worksite, road or rail management plan is established in accordance with workplace requirements
	2.6 Configurations are maintained, including adjustment, modification, repair or replacement in accordance with job and workplace requirements
	2.7 Configurations are maintained and completed in agreed timeframes, to design standards or maintenance documents in accordance with workplace requirements
	2.8 Profiling is checked in accordance with workplace requirements
	2.9 Incidents or unplanned events are responded to in accordance with workplace requirements
	2.10 Quality checks of work are undertaken in accordance with workplace requirements to ensure fit for service
3 Complete work and documentation	**3.1** Completed work is checked against maintenance documents for compliance and anomalies reported in accordance with workplace requirements
	3.2 Incidents or unplanned events are reported in accordance with workplace requirements
	3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4 Plant, tools and equipment are cleaned, checked, and returned to storage in accordance with workplace requirements

3.5 Surplus materials are returned to storage or disposed of in accordance with workplace requirements

3.6 Work permits are completed, and rail traction configurations are fit for service in accordance with workplace requirements

3.7 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT26 Maintain overhead rail traction configurations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT008 Maintain overhead rail traction configurations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- maintaining at least three (3) of the following types of system configurations:
  - overlap
  - cross-over
  - turnout crossings
  - train/tram crossing
- using at least one (1) of the following types of mobile plant and height equipment:
  - elevated work platform (EWP)
  - mobile platforms
  - ladder
- using equipment and tools required for maintaining overhead rail traction configurations, including:
  - cant gauge
  - height and stagger gauge
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:

    - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- traction configuration maintenance documents
- maintenance of traction configurations, including:
    - types of components
    - maintenance/repair procedures
    - inspection and recording procedures
- diagnosis and correction of simple faults in specific traction configurations, including:
    - types and causes
    - determination of appropriate corrective actions
    - repair and replace procedures for components of specific configurations
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment, plant and PPE currently used in industry for maintaining overhead rail traction configurations
- applicable documentation, including workplace requirements, maintenance documents, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT009 Maintain overhead traction components and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to maintain or repair overhead traction equipment, components and hardware in the electricity supply industry (ESI).

It includes repairing or replacing components or equipment and hardware, undertaking safe working practices on or about the running line/track, identifying and confirming road/rail management plans, and electrical permits.

It also includes inspecting and checking equipment, components and hardware are fit for service and are within normal parameters and maintenance records are updated.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT002 Install overhead traction components and equipment

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for maintenance of overhead traction equipment or components	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Relevant maintenance documents are identified and obtained
	1.3 Plant, tools, equipment, components and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Worksite, road or rail management plan is prepared in accordance with workplace requirements
	1.8 Environmental constraints applicable to the work are identified and control measures applied
2 Perform maintenance of overhead traction equipment or components	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with

		workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Work permits are instructed and issued and where appropriate signed in accordance with workplace requirements
	2.5	Worksite, road or rail management plan is established in accordance with workplace requirements
	2.6	Overhead traction equipment or components is maintained including repair or replacement in accordance with design standards, drawings and workplace requirements
	2.7	Overhead traction equipment or components are maintained and completed in agreed timeframes, to design standards or maintenance documents in accordance with workplace requirements
	2.8	Components or equipment and hardware are confirmed fit for service in accordance with workplace requirements
	2.9	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.10	Quality checks of work, including visual inspections, are undertaken in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked against maintenance documents for compliance and anomalies reported in accordance with workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are completed, and overhead traction

equipment or components are fit for service in accordance with workplace requirements

3.7 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT28 Maintain overhead traction components and equipment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT009 Maintain overhead traction components and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- maintaining at least two (2) of the following types of equipment:
  - fuse switches
  - dropout fuses
  - section insulators
  - neutral sections
  - switches/isolators
  - links
  - fuses
  - surge diverters
  - transformers
- maintaining at least five (5) of the following types of components:
  - cantilever hardware
  - insulators
  - head span
  - pull-offs
  - push-offs
  - registration fittings
  - steady span
  - tension regulators
  - cross spans
  - tramway support network

  - pendulum
  - rigid rail conductor
- maintaining at least two (2) of the following types of fittings:
  - preformed fittings
  - compression fittings
  - wedge fittings
  - bolted splices
  - fork collar sockets
  - conical splices
- maintaining at least three (3) of the following types of connecting components:
  - feeders (drops, cross track)
  - dissimilar conductors
  - lugs
  - bolted clamp
  - drapes/potential jumper
  - droppers
- using at least two (2) of the following required for maintaining overhead traction components and equipment:
  - voltage detectors
  - micrometer/gauge
  - tension wrench
  - dynamometer
  - specialised tools
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- overhead traction components and equipment maintenance documents
- types and purpose of overhead traction equipment, including:
  - switches/isolators

    - fuse switches
    - dropout fuses
    - links
    - section insulators
    - neutral sections
    - surge diverters
    - transformers
    - fuses
- types and purpose of overhead components, including:
    - cantilever hardware
    - droppers
    - span or bay components
    - portal hardware
    - head span hardware
    - section insulators
    - neutral sections
    - registration fittings
    - steady span
    - tension regulators
    - cross spans
    - low clearance components
- types of conductors used for overhead wiring, including:
    - copper hard-drawn
    - copper cadmium
    - copper tin-bearing
    - aluminium
    - steel
    - other alloyed conductors
    - rigid rail conductor
- types of traction wire support structures, including:
    - portals
    - cantilevers
    - twin track cantilevers
    - drop vertical
    - head spans
    - cross spans
    - pull-offs
    - push-offs
- types and purpose of ancillary equipment, including:

    - surge arresters
    - booster
    - auxiliary transformers
- methods for replacing conductors, including the use of:
    - preformed fittings
    - compression fittings
    - wedged fittings
    - bolted splices
    - lugs
    - bolted clamps
    - fork collar sockets
    - conical splices
- methods for replacing components, including:
    - feeders (drops, cross track)
    - droppers
    - dissimilar conductors
    - jumpers
    - surge arresters
- use of plant and equipment for maintenance work, including:
    - elevated work platforms (EWPs)
    - ladders
    - works trains
    - rail-mounted overhead wiring equipment/vehicles
    - road/rail height access machinery/vehicles
    - voltage detectors
    - micrometer/gauges
    - tension wrenches
    - dynamometers
    - other specialised tools
- maintenance of overhead traction equipment and components, including:
    - maintenance/repair procedures
    - inspection and recording procedures
- diagnosis and correction of simple faults in specific overhead traction equipment and components, including:
    - types and causes
    - determination of appropriate corrective actions
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, plant, equipment and PPE currently used in industry maintaining overhead traction components and equipment
- applicable documentation, including workplace requirements, maintenance documents, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT010 Maintain rail traction bonds

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to maintain rail traction bonds in the electricity supply industry (ESI).

It includes the maintenance, testing and repair of temporary and permanent traction bonds, bonding cables, bonding equipment and hardware whilst undertaking safe working practices on or about the running line/track, identifying and confirming road/rail management plans and electrical permits.

It also includes checks to confirm bonds, bonding cables, bonding equipment and hardware have been maintained in accordance with maintenance documents, ensuring traction bonding is fit for service, and relevant quality assurance documentation is completed.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT002 Install overhead traction components and equipment

UETDRRT003 Install rail traction bonds

UETDRRT004 Install traction overhead wiring systems

UETDRRT009 Maintain overhead traction components and equipment

UETDRRT011 Maintain traction overhead wiring systems

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for maintenance of traction bonds	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Relevant maintenance documents are identified and obtained
	1.3 Plant, tools, equipment, conductors and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Worksite, road or rail management plan is prepared in accordance with workplace requirements

	1.8	Environmental constraints applicable to the work are identified and control measures applied
2 Perform maintenance of traction bonds	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Work permits are instructed and issued and where appropriate signed in accordance with workplace requirements
	2.5	Cable and surrounds, including rail and other surfaces, are prepared for jointing and terminating in accordance with workplace requirements
	2.6	Maintenance, testing and repair of traction bonds equipment, associated hardware and bonding cables are completed in agreed timeframes, to design standards or maintenance documents and with a minimum of waste in accordance with workplace requirements
	2.7	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.8	Quality checks of work are undertaken in accordance with workplace requirements to ensure fit for service
3 Complete work and documentation	**3.1**	Completed work is checked against maintenance documents for compliance and anomalies reported in accordance with workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked, and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of

in accordance with workplace requirements

3.6 Work permits are completed and traction bonds are fit for service in accordance with workplace requirements

3.7 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT24 Maintain rail traction bonds.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT010 Maintain rail traction bonds

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- maintaining at least two (2) of the following types of connecting bond cables and components:
  - covered or bare aluminium bonds
  - copper bonds
  - steel bonds
  - steel rail
- using at least three (3) of the following types of equipment, tools and testers required for maintaining rail traction bonds:
  - bonding specific tools
  - crimping devices
  - thermal moulds
  - rail drill
  - bonding fittings
  - explosive power tools
  - meter or tester
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- rail traction bonds maintenance documents
- traction bond and cables, including:
  - temporary and permanent bonding preparation and installation methods
  - applications for temporary and permanent bonding
  - components of temporary and permanent bonds
  - interface between traction and signalling circuits
- safe working procedures/practices when carrying out temporary and permanent bonding, including:
  - PPE
  - electrical and visual testing of the PPE
- maintenance of traction bond, cables and equipment, including:
  - types and components
  - types and function of tools and equipment
  - maintenance/repair procedures
  - inspection and recording procedures
- diagnosis and correction of simple faults in traction bonds, including:
  - types and causes
  - determination of appropriate corrective actions
  - repair and replace procedures
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for maintaining rail traction bonds
- applicable documentation, including workplace requirements, maintenance documents, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT011 Maintain traction overhead wiring systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to maintain traction overhead wiring systems in the electricity supply industry (ESI).

It includes repairing or replacing wiring systems, undertaking safe working practices on or about the running line/track, identifying and confirming road/rail management plans, and electrical permits.

It also includes inspecting, diagnosing faults of wiring systems ensuring they are fit for service within normal parameters, including updating of maintenance records.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT002 Install overhead traction components and equipment

UETDRRT004 Install traction overhead wiring systems

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain overhead traction wiring systems	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Relevant maintenance documents are identified and obtained
	1.3 Plant, tools, equipment, materials and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Worksite, road or rail management plan is prepared in accordance with workplace requirements
	1.8 Environmental constraints applicable to the work are identified and control measures applied
2 Perform maintenance on overhead traction wiring systems	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with

		workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Work permits are instructed and issued and where appropriate signed in accordance with workplace requirements
	2.5	Worksite, road or rail management plan is established in accordance with workplace requirements
	2.6	Overhead traction wiring systems are maintained, including repairing or replacing, and overhead traction conductors are modified and re-adjusted in accordance with workplace requirements
	2.7	Overhead traction wiring systems are maintained within agreed timeframes, to design standards or maintenance documents in accordance with workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with workplace requirements to ensure fit for service
3 Complete work and documentation	**3.1**	Completed work is checked against maintenance documents for compliance and anomalies reported in accordance with workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked, and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are completed and overhead traction wiring systems are fit for service in accordance with workplace requirements
	3.7	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT22 Maintain traction overhead wiring systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT011 Maintain traction overhead wiring systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- maintaining at least four (4) of the following types of system equipment and fittings:
  - support structure
  - span
  - section insulator
  - neutral section
  - droppers
  - support equipment
  - tension regulators
  - stay/guy wire
  - tramway support network
- maintaining at least two (2) of the following types of traction conductors and cables:
  - contact/trolley*
  - catenary
  - feeder
  - midpoint anchor
  - earth conductor
  - return conductor
  - drape/potential jumper
  - (*must do)
- operating from at least one (1) of the following types of mobile plant and height equipment:
  - elevated work platform (EWP)

    - ladder
    - mobile platform
- using at least two (2) of the following equipment and tools required for overhead rail traction wiring systems:
    - tensioning equipment*
    - specialised tools
    - electrical testing equipment
    - geometry profiling equipment
    - (*must do)
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
    - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- application, purpose and types of permits
- safe use of plant, tools and equipment
- traction overhead wiring systems maintenance documents
- methods for running wire systems or conductors
- electrical wiring system components, including:
    - earth wires
    - feeder wire
    - catenary wire
    - contact/trolley wire
    - return conductor
    - insulators
    - surge arresters
    - cantilevers
    - droppers
    - tensioning equipment
    - current collectors
    - tram support network
    - tram fittings
    - low clearance components

- types of electrical traction systems, including:
  - auto-tensioning
  - spring loaded tension
  - balance weight anchor (BWA)
  - fixed tension
- relationship of the components, apparatus and conductors to the operation of the traction system
- effective current collection and wire interface
- effective registration in the traction power system
- methods of profiling overhead traction wire, including:
  - factors that impact on current collectors to achieve smooth current collector transitions and interfaces
- dynamic and static forces, including:
  - types that effect traction systems
  - techniques to minimise adverse effects
- maintenance of overhead traction wiring systems, including:
  - types of equipment and components
  - types and function of tools and equipment
  - maintenance/repair procedures
  - inspection and recording procedures
- diagnosis and correction of simple faults in specific overhead wiring systems, including:
  - types and causes
  - determination of appropriate corrective actions
  - repair and replace procedures for overhead wiring systems
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment, plant and PPE currently used in industry for maintaining traction overhead wiring systems
- applicable documentation, including workplace requirements, maintenance documents, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT012 Operate rail road height access plant near rail traction systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to operate rail road height access plant near rail traction systems in the electricity supply industry (ESI).

It includes operating and using road rail height access plant to install and maintain overhead traction systems. It also includes performing pre-operational inspection, undertaking safe working practices on or about the running line/track, road/rail management plans, relevant permits and post-operational inspection.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to operate road rail height access plant	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Hazards are identified, risks assessed and control measures identified and applied
	1.3 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Work permits are organised in accordance with workplace requirements
	1.5 Pre-operational inspections of plant are performed in accordance with workplace requirements
	1.6 Worksite, road or rail management plan is prepared in accordance with workplace requirements
	1.7 Environmental constraints applicable to the work are identified and control measures applied
2 Operate road rail height access plant	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Work permits are instructed and issued and where appropriate signed in accordance with workplace requirements
	2.5 Worksite, road or rail management plan is established in accordance with workplace requirements
	2.6 Road rail height access plant is operated in accordance with workplace requirements
	2.7 Incidents or unplanned events are responded to in accordance with workplace requirements

3 Conclude operation of road rail height access plant	**3.1** Post-operational inspections of plant are performed, and non-compliances are reported in accordance with workplace requirements
	3.2 Incidents or unplanned events are reported in accordance with workplace requirements
	3.3 Rail road height access plant is cleaned and secured, and packed up for return to storage
	3.4 Work permits are completed in accordance with workplace procedures
	3.5 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT29 Operate rail road traction height access equipment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT012 Operate rail road height access plant near rail traction systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- conducting pre-operational inspections
- conducting post-operational inspections
- operating at least one (1) of the following:
  - elevated work platform (EWP) in the performance of work associated with rail traction
  - road rail platform vehicle in the performance of work associated with rail traction
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, logbooks, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice, organisational and workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - environmental considerations
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- application, purpose and types of permits
- operator requirements, including:
  - pre-operational inspections

  - post-operational inspections
  - logbook
- road/rail traction height access plant and associated equipment, including:
  - characteristics, capabilities and limitations
  - prestart requirements
  - operation procedure
  - basic problem-solving equipment faults
  - safe working procedures when mechanical failure occurs
  - use of appropriate communication systems
  - isolation procedures
  - operating equipment under live overhead equipment and adjacent to or in the vicinity of live overhead equipment
- procedures for effective road and rail management plans
- emergency procedures in the event of an electrical incident/accident
- emergency procedures in the event of a safe working/road traffic incident/accident
- procedures for rescuing a person from height access plant, including:
  - methods for rescuing a person
  - methods for rescuing a person from a disabled height access plant
  - methods for rescuing an incapacitated person from height access plant
  - methods for rescuing a person in contact with live overhead equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate tools, facilities, road rail height access plant, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT013 Perform rail traction switching operations to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to perform rail traction switching operations to a given schedule in the electricity supply industry (ESI).

It also includes procedures for communicating with the electrical control officer/system, isolating electrical equipment, proving the area is de-energised and earthed or rail-connected, issuing and cancelling/relinquishing of electrical permits and returning affected sections to service.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT001 Install overhead rail traction configurations

UETDRRT002 Install overhead traction components and equipment

UETDRRT004 Install traction overhead wiring systems

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for rail traction switching operations to a given schedule	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Operational/switching schedules are obtained and confirmed with stakeholders, as required
	1.3 Alterations to the schedules which may be required after assessing the worksite is communicated to stakeholders for formal approval
	1.4 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with schedule and workplace requirements
	1.7 Work permits are organised in accordance with workplace requirements
	1.8 Worksite, road or rail management plan is prepared in accordance with workplace requirements
	1.9 Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace requirements
2 Carry out rail traction switching operations to a	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to

given schedule		be performed are applied and monitored
	2.2	The use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Communications with electrical control officer are established and maintained during switching operation in accordance with workplace requirements
	2.5	Rail traction switching operations are completed in agreed timeframes in accordance with workplace requirements
	2.6	Electrical equipment and associated sections for the worksite are isolated and proven de-energised using appropriate testing devices and earthed or rail connected, where required, in accordance with schedule and workplace requirements
	2.7	Work permits are instructed and issued, and signed in accordance with workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Work permits are cancelled or relinquished in accordance with workplace requirements
	2.10	Electrical equipment and associated sections for the worksite are returned to service in accordance with schedule and workplace requirements
3 Conclude rail traction switching operations to a given schedule	**3.1**	Incidents or unplanned events are reported in accordance with workplace requirements
	3.2	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.3	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.4	Work records, reports and documentation are completed and processed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT30 Perform to a given schedule rail traction switching operations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT013 Perform rail traction switching operations to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- using and verifying switching scheduling documents
- using appropriate communication with the following:
  - electrical control officer
  - permit holders
  - other network stakeholders
- performing at least one (1) of the following types of rail traction switching operations to a given schedule:
  - high voltage (HV)/low voltage (LV) circuit breakers
  - HV/LV switches
  - HV/LV isolators
  - HV/LV links
  - HV/LV bridges
  - HV/LV fuses
- using at least one (1) of the following types of testing equipment whilst performing overhead traction switching:
  - voltage detectors
  - field intensity meter
  - polarity testers
  - phase rotation indicators
- using all of the following:
  - portable earthing/rail-connecting equipment
  - operating rods/sticks

- completing all of the following stages of electrical permits:
  - writing
  - issuing
  - cancelling or relinquishing
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- standards, codes, legislation, supply authority regulations and workplace requirements applicable to:
  - switching schedules
  - electrical operating diagrams
  - permits
  - communication procedures
  - PPE required for switching
  - danger tag or lockout procedures
- types of rail traction operation switches
- types of testing equipment for overhead traction switching
- portable earthing/rail-connecting equipment
- operating rods/sticks
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic

and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for performing rail traction switching operations to a given schedule
- applicable documentation, including workplace requirements, switching schedules, electrical operating diagrams, permits, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRRT014 Test and verify rail traction installations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to test and verify rail traction installations in the electricity supply industry (ESI).

It includes inspecting, testing and verifying rail traction installations are safe and comply with design and maintenance standards. It also includes working safely, reporting defects and non-compliances in accordance with workplace requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS007 Install and maintain distribution overhead conductors and cables

UETDRIS012 Install and maintain poles, structures and hardware

UETDRRT001 Install overhead rail traction configurations

UETDRRT002 Install overhead traction components and equipment

UETDRRT003 Install rail traction bonds

UETDRRT004 Install traction overhead wiring systems

UETDRRT008 Maintain overhead rail traction configurations

UETDRRT009 Maintain overhead traction components and equipment

UETDRRT010 Maintain rail traction bonds

UETDRRT011 Maintain traction overhead wiring systems

UETDRRT012 Operate rail road height access plant near rail traction systems

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect, test and verify rail traction installations	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Required design standards and construction plans are obtained
	1.3 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Specialist test and measurement equipment for testing and verification of rail traction installations are obtained and confirmed in working order in accordance with

		workplace requirements
	1.8	Worksite, road or rail management plan is prepared in accordance with workplace requirements
2 Carry out inspection, test and verification of rail traction installations	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Work permits are instructed and issued and where appropriate signed in accordance with workplace requirements
	2.5	Worksite, road or rail management plan is established in accordance with workplace requirements
	2.6	Rail traction installations, conductors, hardware and components are inspected, secured and connected in accordance with design standards and workplace requirements
	2.7	Rail traction installations are tested to verify fit for service
	2.8	Rail traction bonding for the installation is inspected and compliance verified in accordance with design standards and workplace requirements
	2.9	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Report inspection and test results	**3.1**	Incidents or unplanned events are reported in accordance with workplace requirements
	3.2	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.3	Non-compliance defects are identified, corrected and/or reported in accordance with workplace requirements
	3.4	Recommendations for rectifying defects are made in accordance with workplace requirements

3.5 Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.7 Work permits are completed and rail traction installation is fit for service in accordance with workplace requirements

3.8 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT99 Test and verify rail traction installations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRRT014 Test and verify rail traction installations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- inspecting rail traction installations for compliance to design standards using at least one (1) of the following types of inspection equipment:
  - infra-red camera
  - camera
  - binoculars
  - drone
  - laser measuring equipment
  - portable pantograph
  - laser gauge
- testing and verifying against design standards to rectify non-compliances on at least three (3) of the following components and hardware:
  - insulators
  - clamps
  - conductor spacers/knuckles
  - structural components
  - auto tensioning devices
  - switches
- testing and verifying against design standards to rectify non-compliances on at least one (1) of the following types of rail traction conductors:
  - copper
  - aluminium
  - steel
  - aluminium/steel reinforced

    - rigid rail
- testing and verifying the rail traction bonding against design standards
- working safely aloft using at least one (1) of the following types of mobile plant and height equipment:
    - elevated work platform (EWP)
    - portable platform
    - ladder
- using the following types of testing and earth/bond equipment:
    - volt metre alternating current (a.c.) or direct current (d.c.)
    - earthing conductors/short circuiting conductor
    - insulation resistance tester
- recording test results in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
    - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- requirements for testing rail traction installation for maintenance and construction for safe operational use, including:
    - test results that show a rail traction installation is safe for connection to the supply
    - periodic inspection results and tests that show construction site wiring and equipment is safe to use
    - periodic inspection results and tests that show the rail traction installations electrical equipment are safe to use
- testing techniques, including:
    - rail traction system phasing, phase rotation, polarity and network standards
    - electrical rail traction network voltage levels as per network supply standards
    - potential rail traction network for neutral conductors
    - insulation resistance
    - earthing system/rail traction cables and components
- testing and verifying procedures for rail traction installations, including:
    - testing and recording defects

  - verifying against design standards
  - electrical compliance
  - documentation of testing of quality assurance
- energised tests and commissioning, as required, to verify rail traction installations
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for testing and verifying rail traction installations
- applicable documentation, including workplace requirements, relevant design and maintenance standards, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSB001 Perform substation switching operations to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to perform substation switching operations to a given schedule in the electricity supply industry (ESI).

It includes switching operations in zone, traction or terminal substations in accordance with workplace requirements.

It also includes using specialised tools, personal protective equipment (PPE) and testing equipment.

Note: Entry requirement into the unit is for users that have successfully completed:

- *a UET Certificate III, IV, Diploma or Advanced Diploma qualification or the equivalent issued in an Australian state or territory*
- *or*
- *an Electrician or Electrical Fitter qualification or the equivalent issued in an Australian state or territory*
- *or*
- *in the final stages of completing an apprenticeship in the above qualifications.*

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Not applicable, refer to unit application.

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for substation switching	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Switching schedules are obtained and confirmed in accordance with workplace requirements
	1.3 Plant, tools, equipment and PPE required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks are assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.6 Work permit/approval is organised in accordance with workplace requirements
	1.7 Worksite is prepared to in accordance with the work plan and workplace requirements
2 Carry out substation switching	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of plant, tools and equipment are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Communication with switching control officer is established and maintained during switching operations in accordance with workplace requirements
	2.5 Approval is obtained to commence substation switching

		in accordance with workplace requirements
	2.6	Substation switching is performed to isolate and/or transfer supply in accordance with switching schedule and workplace requirements
	2.7	Work permit is written and issued in accordance with the switching schedule and workplace requirements
	2.8	Work permit is cancelled or relinquished in accordance with workplace requirements
	2.9	Approval is obtained to commence restoration of supply in accordance with workplace requirements
	2.10	Substation switching is performed to restore supply in accordance with the switching schedule and workplace requirements
	2.11	Switching controller is notified restoration has been completed in accordance with workplace requirements
	2.12	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Incidents or unplanned events are reported in accordance with workplace requirements
	3.2	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.3	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.4	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB39 Perform power system substation switching operation to a given schedule.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSB001 Perform substation switching operations to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- establishing and maintaining communications with the following:
  - switching controller
  - permit holders
- obtaining approval to perform substation switching to a given schedule
- performing substation switching operations to a given schedule completing all of the following:
  - isolation
  - restoration
- using at least three (3) of the following specialist tools and equipment:
  - voltage detectors*
  - operating sticks
  - portable earths
  - phasing equipment
  - operating handles
  - (*must do)
- operating at least four (4) of the following electrical apparatus:
  - links
  - earth switches
  - air-break switches
  - circuit breakers
  - fuses
- operating the substation electrical equipment remotely via a panel/display

- dealing with an unplanned event on at least one (1) occasion
- organising, issuing, cancelling or relinquishing relevant work permits/approvals in accordance with workplace requirements
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of work permits/approvals
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- substations, including:
  - types
  - layouts
  - bus bar configurations
  - types of electrical apparatus
  - types, function and operating characteristics of various switchgear
  - earthing systems
  - voltage regulation
- protection systems, including:
  - types, function and operating characteristics
  - protection equipment
  - interconnectors and possible sources of back-feed
- substation power supplies, including:
  - low voltage supply
  - batteries and battery charges
- substation switching principles, including:
  - manuals, system diagrams/plans and drawings
  - responsibilities of the switching operator
  - isolation, restoration, paralleling and transferring
  - earthing requirements and procedures
  - requirements and procedures of the operation of switchgear
  - safety requirements and procedures

- use and operation of specialised equipment and tools
- emergency/fault switching

- substation automation system, including:
  - supervisory control and data acquisition (SCADA) system security interlocks and access restrictions
  - function of the main components of a local/remote control system
  - operation procedure for switching from a local control station
  - functions of SCADA (or any other relevant data acquisition and control) systems and its main components
  - operation of a field devices using SCADA systems via a RAT, dial up annunciated system and local control station.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry performing substation switching operations to a given schedule
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the monitoring of high voltage (HV) distribution and sub-transmission networks in real time. This includes voltage control and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and coordination of field repair crews to respond to and rectify abnormalities and liaison with other electrical authorities.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy

management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS policies, procedures and programs

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the coordination of HV distribution and sub-transmission network	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of HV distribution and sub-transmission network, are reviewed and determined
	1.2 Purpose of the coordination of the network is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the coordination of the network are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the coordination of HV distribution and sub-transmission network	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Coordination decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the coordination process are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within

		an agreed timeframe according to requirements
	2.7	Testing of coordination process is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the coordination of HV distribution and sub-transmission network	**3.1**	Final review of the coordination processes is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of coordination documents are issued, and records updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector

Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating on at least three (3) occasions the coordination of system manipulations that encompass:
  - high voltage (HV) sub-transmission and distribution network
  - HV sub-transmission and distribution network manipulation to control loading on equipment
  - transformers with HV windings (if applicable to enterprise equipment)
  - HV busbars
  - HV isolators
  - HV switchgear (applicable to enterprise equipment)
- completing all of the following:
  - writing switching instructions
  - checking switching instructions
  - coordinating switching instructions
  - calculating plant loading
  - preparing and authorising HV sub-transmission and distribution switching program
  - monitoring switching progress
  - monitoring the status of access permits/authorities on HV network equipment
  - ensuring network plant operates within design and regulatory requirements on a real time basis
  - dispatching and communicating with field crews to respond/rectify system abnormalities
  - applying and administrating supervisory control and data acquisition (SCADA) (if applicable to enterprise equipment)
  - analysing and diagnosing system failures
  - calculating and analysing paralleling conditions on the interconnected HV system

- monitoring and managing switching to:
  - manage load
  - manage voltage
  - minimise loss
  - maximise system reliability
  - allow safe network access for maintenance activities
  - allow safe network access for construction activities
  - validating fault reports arising from system disturbances
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements, such as WHS/OHS and electrical safety
  - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- HV system switching principles, including switching authorisation procedures, encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
  - requirements for the use of manuals, system diagrams/plans and drawings

- types and characteristics of HV systems and equipment to be switched
- procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances (SAD)
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
- techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures

- coordinating and directing switching instructions encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the coordination and directing of switching schedules instructions
  - relationship between the operating authorities and HV customers, and operating agreements
  - techniques in coordinating and directing HV and low voltage (LV) switching of electrical networks
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
  - responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
  - techniques in gathering, collating and confirming data on switching procedures
- HV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to HV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the HV switching operator
  - operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with HV overhead and substation equipment -

test instruments, sticks, interrupters and arc stranglers
  - HV switchgear – types, categories, application and operating capabilities
  - operation of HV overhead switching or indicating devices - fuses, disconnect fuses, load switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, air-breaks, switches, disconnects, live line clamps, phasing sticks and phasing tester
  - operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications
  - restrictions pertaining to HV switching equipment
  - procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing, and HV switching techniques
  - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; points of isolation and earthing locations (safety and working earths); and responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards,

equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO002 Coordinate high voltage transmission network

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the monitoring of high voltage (HV) transmission networks in real time. This includes power quality, alarm interpretation, facilitating and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and coordination of field repair crews to respond to and rectify abnormalities and liaise with other electrical authorities.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRSO004 Develop and evaluate power systems transmission switching programs

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the coordination of HV transmission networks	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of HV transmission networks, are reviewed and determined
	1.2 Purpose of the coordination of the network is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the coordination of the network are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications

	1.6	Work roles and tasks are allocated according to requirements and individual competencies
	1.7	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.8	Liaison and communication issues with other authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.9	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.10	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the coordination of HV transmission networks	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Coordination decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the coordination process are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative actions can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of coordination process is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the coordination of HV transmission networks	**3.1**	Final review of the coordination processes is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of coordination documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO47 Coordinate high voltage transmission network.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO002 Coordinate high voltage transmission network

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating on at least three (3) occasions the coordination of system manipulations that encompass:
  - high voltage (HV) sub-transmission and distribution network
  - HV sub-transmission and distribution network manipulation to control loading on equipment
  - transformers with HV windings (if applicable to enterprise equipment)
  - HV busbars
  - HV isolators
  - HV switchgear (applicable to enterprise equipment)
- coordinating a HV transmission network, including all of the following:
  - writing switching instructions
  - checking switching instructions
  - coordinating switching instructions
  - calculating plant loading
  - preparing and authorising HV sub-transmission and distribution switching programs
  - monitoring switching progress
  - monitoring the status of access permits/authorities on HV network equipment
  - ensuring network plant operates within design and regulatory requirements on a real time basis
  - dispatching and communicating with field crews to respond/rectify system abnormalities
  - applying and administrating of supervisory control and data acquisition (SCADA) (if applicable to enterprise equipment)
  - analysing and diagnosing system failures
  - calculating and analysing paralleling conditions on the interconnected HV system

- allowing safe network access for maintenance activities, including monitoring and managing switching, to:
  - manage load
  - manage voltage
  - minimise loss
  - maximise system reliability
  - allow safe network access for maintenance activities
  - allow safe network access for construction activities
  - validating fault reports arising from system disturbances
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- HV fault switching principles encompassing:
  - primary causes, effects and types of HV electrical faults
  - HV protection devices - main components, types, categories, applications and functions
  - basic principle of operation of HV system protection devices
  - protection coordination and protection zoning
  - HV feeder auto-reclosing suppression encompassing – function and application
  - circuit condition requirements and switching considerations when paralleling and separating HV feeders
- coordinating and directing switching instructions encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the coordination and directing of switching schedules instructions
  - relationship between the operating authorities and HV customers, and operating agreements
  - techniques in coordinating and directing HV and low voltage (LV) switching of electrical networks
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
  - responsibilities of the switching operator

  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
  - techniques in gathering, collating and confirming data on switching procedures
- alternating current (a.c.) transmission system components encompassing:
  - support structures and reasons for selection
  - insulators and reasons for selection
  - conductors and reasons for selection
  - vibration management systems and principles
  - line ratings based on voltage, span, tension and temperature
- a.c. transmission line models encompassing:
  - types of transmission line models based on line length
  - calculation of voltage drop, line regulation and transmission efficiency
  - load sharing between lines
- basic design features and characteristics of transmission structures and associated equipment and/or components encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing of poles/structures and associated equipment and or components
  - transmission systems principles – terminologies, primary and secondary, voltage levels and types of lines
  - characteristics of structure - types of structure (towers and poles, concrete and steel), characteristics of types of structures, installation methods and maintenance techniques
  - characteristics of associated equipment used on structures – insulators and earthing (overhead earth and communication lines).

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards,

equipment specifications, regulations, codes of practice, network drawings, operational event data and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO003 Coordinate power system operations in a regulated energy market

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the coordination of system operations in a regulated energy market. It includes the relevant application of knowledge of the National Electricity Market (NEM), the practices and rules used in facilitating the coordination of operations in a regulated energy market.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Distribution and Sub-transmission Pathway Unit Group

UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Transmission Pathway Unit Group

UETDRSO002 Coordinate high voltage transmission network

UETDRSO004 Develop and evaluate power systems transmission switching programs

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to coordinate system operations in a regulated energy market	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of the electricity market, are reviewed and determined
	1.2 Energy market requirements are established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Energy market and associated equipment operational prerequisites are identified and established in accordance with manufacturer and/or enterprise/site procedures
	1.4 Electricity market coordination and control procedures are discussed with and/or directed to appropriate

		personnel in order to ascertain the project brief
	1.5	Testing parameters are ascertained from established policies, procedures and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Need for relevant work permits is identified to coordinate the performance of work according to requirements and/or established procedures
	1.12	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
2 Coordinate system operations in a regulated energy market	**2.1**	Strategic plans are developed incorporating organisational initiatives in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Decisions concerning coordination are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and

		preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements
	2.7	Testing of the decision to be implemented is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the coordination of system operations in a regulated energy market	**3.1**	Final review of the coordination is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the work
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are finalised/commissioned
	3.3	Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of coordination documents (electronic/paper) are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO49 Coordinate power system operations in a regulated energy market.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO003 Coordinate power system operations in a regulated energy market

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing on at least three (3) occasions the following:
  - dispatching energy to the electricity market
  - responding to electricity market fluctuations/demands
  - manipulating the system to ensure reliable operation in response to electricity market requirements
- demonstrating knowledge of all the following:
  - principals and objectives of the electricity market
  - the role of ancillary services in the operation of the electricity market
  - service provider obligations in the electricity market
  - connection and access requirements to the electricity market
  - analysis of pricing concepts
  - contractual obligations
  - scheduling of generation assets
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings

    - the purpose and features of typical types of co-generation systems
- enterprise-specific policies and procedure instructions encompassing:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures
    - rules and regulations
    - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
    - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
    - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific procedures and work practices relating to managing network demand encompassing:
    - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to managing network demand
    - requirements for the use of demand management manuals, system diagrams/plans and drawings
    - identifying and interpreting enterprise demand management procedures
    - techniques in applying enterprise demand management procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, relevant modelling tools, drawings and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO004 Develop and evaluate power systems transmission switching programs

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the development and evaluation of activities required to place the transmission network in a state in which work can safely be performed whilst minimising customer outages. The format is typically a written sequence of switching items in a pre-defined format.

It includes planning for the management of the network and multiple outages. It encompasses the calculation of network loading conditions to ensure the network will operate within design parameters and in compliance with national electricity code.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan and coordinate for the preparation of high voltage (HV) transmission switching programs	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of the switching program, are reviewed and determined
	1.2 Purpose of the switching program is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the switching program are obtained or established with appropriate personnel
	1.4 Switching procedures are discussed with and/or directed to appropriate personnel in order to ascertain the project brief
	1.5 Switching parameters are ascertained from established policies, procedures and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to

		requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with other/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out and coordinate the preparation of HV transmission switching programs	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Decisions concerning the preparation of the HV transmission switching program are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	The effectiveness of the finished project is analysed in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

	2.7	Testing of the program is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the preparation of HV transmission switching programs	**3.1**	Final review of the switching program is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of switching program documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO38 Develop and evaluate power systems transmission switching programs.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO004 Develop and evaluate power systems transmission switching programs

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- developing and evaluating at least four (4) switching programs that between them integrates all of the following:
  - a transformer with an extra-high voltage (EHV) winding
  - EHV busbars
  - EHV isolators
  - EHV switchgear (applicable to enterprise equipment)
  - phasing and phase rotation
- commissioning a project that includes more than one (1) item of EHV plant that includes a transformer:
  - a planned liaison with a high voltage (HV) customer
  - activities that address the correction of errors in the process
- preparing switching instructions, testing and earthing all of the following:
  - transformer types
  - busbar types
  - transmission line types
  - circuit breakers, isolators or switches
- conducting all of the following:
  - checking switching instructions
  - calculating plant loading
  - managing the development of multiple switching programs
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply system within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the HV equipment associated with substations
- substations and power transformers encompassing:
  - relationship between the substations within an overall power system - purpose and location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - characteristics of a reactors - description and purpose
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordination and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management

procedures, and regulatory requirements, such as WHS/OHS and electrical safety
    - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
    - methods of conducting audits on correct access authority procedures
    - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
    - issue and receipt of operating agreements
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
    - particular reference to state and territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV switching principles encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and network interconnectors source of possible back-feed
    - role of the HV switching operator
    - operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, and access authorities and permits
    - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
    - types and categories of HV switchgear
    - application, function and operating capabilities of switchgear
    - restrictions pertaining to HV switching equipment
    - procedures for the isolation of HV transmission main and working earths
    - earthing HV electrical apparatus practices and procedures for access - purposes of operational and additional work part on-site earths, factors determining the location and effectiveness of operational earthing, acceptable industry procedures, personal protective equipment (PPE), and HV switching techniques
    - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- HV system switching principles, including switching authorisation procedures to an extent indicated by the following aspects:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings

- types and characteristics of HV systems and equipment to be switched
- procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
- techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures

- HV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to HV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the HV switching operator
  - operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - HV switchgear – types, categories, application and operating capabilities
  - operation of HV overhead switching or indicating devices - fuses, disconnect fuses, load switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, air-breaks, switches, disconnects, live line clamps, phasing sticks and phasing tester
  - operation of protection systems and substation equipment - fault levels and settings, types and applications, protection systems and substation equipment fault levels and settings and types and applications
  - restrictions pertaining to HV switching equipment
  - procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing, and HV switching techniques
  - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; points of isolation and earthing locations (safety and working earths); and responsibilities of the

switching operator
    - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures
    - rules and regulations
    - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
    - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
    - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific OHS instructions encompassing:
    - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
    - methods of obtaining the up-to-date information on enterprise OHS policies and procedures
    - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
    - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
    - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- substation switching practices encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to substation switching
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols, and identifying switching resources
    - techniques in HV substation switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and commissioning procedures
    - use, care and operation of equipment associated with HV substation equipment - test instruments and sticks

    - HV switchgear – types, categories, application and operating capabilities
    - basic operation of protection systems
    - restrictions pertaining to HV substation switching equipment
    - restrictions pertaining to enterprise-specific procedures
- transient over voltages encompassing:
    - causes and effects of transient over voltages - switching transients and lightning transients, and effects on plant items
    - control techniques and systems - diverters, shield wires and circuit breaker arc control
    - insulation systems - insulation coordination and insulation grading
- commissioning procedures associated with relevant equipment encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
    - requirements for the use of commissioning manuals, system diagrams/plans and drawings
    - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements
- EHV generator control systems encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
    - safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
    - techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
    - operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
    - EHV generator set and control system to EHV distribution assets
- different types and function of transmission components encompassing:
    - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the use and application of transmission components
    - requirements for the use of transmission line construction manuals, system diagrams/plans and drawings
    - types, function and characteristics of transmission components
    - safety policies and procedures precautions related to the handling and installing transmission components
- EHV system load calculation principles encompassing:
    - structure of EHV transmission systems
    - ratings of EHV system components
    - relationship to EHV customers
    - relationship to generation sources
    - methods of determining load on EHV systems
    - records of load on EHV systems

- effect of added load on EHV transmission systems - variation of current, voltage, power, reactive power and power factor
- load flows in parallel or loop operation
- enterprise-specific network coordination tools.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, computerised electrical plant control and monitoring facilities and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, modelling tools, drawings and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the preparation and/or checking of activities required to place the high voltage (HV) distribution and sub-transmission network in a state in which work can safely be performed whilst minimising customer outages. The format is typically a written sequence of switching items in a pre-defined format.

It includes planning outages and taking into account loading of network components. It also includes planning the management of multiple outages on the HV distribution and sub-transmission network and the calculation of network loading conditions to ensure the network is operating within designed parameters.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the preparation of HV distribution and sub-transmission switching programs	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of HV distribution and sub-transmission switching system programs, are reviewed and determined
	1.2 Purpose for the preparation of HV distribution and sub-transmission switching programs is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the preparation of HV distribution and sub-transmission switching programs are obtained or established with appropriate personnel
	1.4 Testing/switching procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief
	1.5 Testing/switching parameters are established from organisational established procedures and policies and

		specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the preparation of HV distribution and sub-transmission switching programs	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Preparation of HV distribution and sub-transmission switching program decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the program is used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate

		authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of the program is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the preparation of HV distribution and sub-transmission switching programs	**3.1**	Final review of the switching program is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of prepared HV distribution and sub-transmission switching program documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO37 Develop high voltage distribution and subtransmission switching programs.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating at least three (3) switching programs that between them encompass the following:
  - a transformer with a high voltage (HV) winding and fixed tap
  - a transformer with a HV winding and on-load tap changer (OLTC)
  - HV busbars
  - HV isolators
  - HV switchgear (applicable to enterprise equipment)
  - phasing and phase rotation
  - commissioning an item of HV plant
  - a planned interruption to a HV customer
  - installation of a mobile generators (if applicable to enterprise equipment)
  - placing distribution feeders in parallel where special considerations are required to cope with capacitors, phase shifts between different bulk supply systems, sensitive earth fault protection and single phase switching
- preparing switching instructions to isolate, test and earth all of the following:
  - all enterprise transformer types
  - all enterprise busbar types
  - all enterprise feeder types
  - all enterprise circuit breakers, isolators or switches
- preparing, writing and checking switching sheets to do all of the following:
  - manage load
  - manage voltage
  - minimise losses
  - maximise network reliability

- checking all above types of switching instructions
- coordinating all above types of switching instructions
- calculating plant loading
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; and how they correlate and their functions
  - characteristics of a transmission, a distribution and a rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders; and the HV equipment associated with substations
- different types and function of distribution components encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
  - types, function and characteristics of distribution components
  - safety policies and procedures precautions related to the handling and installing distribution components
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordination and organising work for a safe outcome according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical

network diagrams for the specific worksite; earth access authorities; safe working area; work to be carried out in confined space or in hazardous environment; specific outsourcing procedures; specific hazard identification, risk classification and management procedures; regulatory requirements, such as WHS/OHS and electrical safety
    - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
    - methods of conducting audits on correct access authority procedures
    - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
    - issuing and receipt of operating agreements
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV switching principles encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and network interconnectors source of possible back-feed
    - role of the HV switching operator
    - operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits; purpose and procedures for operational forms, access authorities and permits
    - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
    - types and categories of HV switchgear
    - application, function and operating capabilities of switchgear
    - restrictions pertaining to HV switching equipment
    - procedures for the isolation of HV transmission main and working earths
    - earthing HV electrical apparatus practices and procedures for access - purposes of operational and additional work part on-site earths, factors determining the location and effectiveness of operational earthing, acceptable industry procedures, personal protective equipment (PPE) and HV switching techniques
    - operating switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- HV fault switching principles encompassing:
    - primary causes, effects and types of HV electrical faults

- HV protection devices - main components, types, categories, applications and functions
- basic principle of operation of HV system protection devices
- protection, coordination and protection zoning
- HV feeder auto-reclosing suppression encompassing – function and application
- circuit condition requirements and switching considerations when paralleling and separating HV feeders

- HV single wire earth return (SWER) system encompassing:
  - application and function of SWER system components
  - circuit arrangement
  - principle of operation
  - hazards and procedures associated with faulty SWER earth systems
  - procedure to isolate, energise and commission SWER substations
- HV system switching principles, including switching authorisation procedures, encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
  - requirements for the use of manuals, system diagrams/plans and drawings
  - types and characteristics of HV systems and equipment to be switched
  - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances
  - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- HV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to HV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the HV switching operator
  - operational forms, access authorities and permits, and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments; purpose and procedures for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - HV switchgear – types, categories, application and operating capabilities
  - operation of HV overhead switching or indicating devices - fuses, disconnect fuses, load

switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, air-breaks, switches, disconnects, live line clamps, phasing sticks and phasing tester
    - operation of protection systems and substation equipment - fault levels and settings, types and applications, protection systems and substation equipment fault levels and settings, types and applications
    - restrictions pertaining to HV switching equipment
    - procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing, and HV switching techniques
    - operating switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- preparation of a HV switching instruction schedule encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; points of isolation and earthing locations (safety and working earths); and responsibilities of the switching operator
    - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures
    - rules and regulations
    - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
    - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
    - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
    - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the WHS/OHS policies and procedures
    - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
    - specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning inspection and testing; emergency response, rescue, evacuation and first aid procedures
    - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
    - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader

programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers, maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- substation switching practices encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to substation switching
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols, and identifying switching resources
    - techniques in HV substation switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and commissioning procedures
    - use, care and operation of equipment associated with HV substation equipment - test instruments and sticks
    - HV switchgear – types, categories, application and operating capabilities
    - basic operation of protection systems
    - restrictions pertaining to HV substation switching equipment
    - restrictions pertaining to enterprise-specific procedures
- transient overvoltage encompassing:
    - causes and effects of transient overvoltage - switching transients and lightning transients, and effects on plant items
    - control techniques and systems - diverters, shield wires and circuit breaker arc control
    - insulation systems - insulation coordination and insulation grading
- procedures to undertake a visual inspection of a scheme encompassing:
    - Commonwealth/state/territory legislation standards, codes, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
    - requirements for the use of manuals, system diagrams/plans and drawings
    - identify obvious deficiencies in operating to the standard functionality
    - techniques in determining device malfunction
    - techniques in determining wiring defects
- commissioning procedures associated with relevant equipment encompassing:
    - Commonwealth/state/territory legislation standards, codes, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
    - requirements for the use of commissioning manuals, system diagrams/plans and drawings
    - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements
- effects of harmonics encompassing:
    - characteristics and effects of harmonics on protection device functions/malfunction

    - effects of harmonics on transformers, generators, motors and quality of supply
- different types and function of distribution underground components encompassing:
    - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the use and application of distribution underground components
    - requirements for the use of underground line construction manuals, system diagrams/plans and drawings
    - types, function and characteristics of distribution underground components
    - safety policies, procedures and precautions related to handling and installing distribution underground components
- HV system load calculation principles encompassing:
    - structure of HV systems
    - ratings of HV system components
    - relationship to HV customers
    - methods of determining load on HV systems
    - records of load on HV systems
    - effect of added load on HV feeders - variation of current, voltage, power, reactive power and power factor
    - load flows in parallel or loop operation
    - enterprise-specific network coordination tools.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO006 Develop low voltage distribution switching programs

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the preparation and/or checking of activities required to place the low voltage (LV) distribution network in a state in which work can safely be performed whilst minimising customer outages. The format is typically a written sequence of switching items in a pre-defined format.

It includes planning outages and taking into account loading of network components. It also includes planning the management of multiple outages on the LV distribution network and the calculation of network loading conditions to ensure the network is operating within designed parameters.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the preparation of LV distribution switching programs	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of LV distribution switching systems, are reviewed and determined
	1.2 Purpose of the switching program preparation is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the LV distribution switching systems are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance

		criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the preparation of LV distribution switching programs	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	LV distribution switching program decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the LV switching systems are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within

		an agreed timeframe according to requirements
	2.7	Testing of LV switching program is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives as per established procedures
3 Complete the preparation of LV distribution switching programs	**3.1**	Final review of the switching program is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the preparation of LV distribution switching programs documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector

Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO36 Develop low voltage distribution switching programs.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO006 Develop low voltage distribution switching programs

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating at least three (3) switching programs that between them encompass at least seven (7) of the following:
  - a transformer with a low voltage (LV) winding and fixed tap
  - LV busbars
  - LV isolators
  - LHV switchgear (applicable to enterprise equipment)
  - phasing and phase rotation
  - commissioning an item of LV plant
  - a planned interruption to a LV customer
  - installation of a mobile generators
- preparing switching instructions to isolate, test and earth all of the following:
  - all enterprise transformer types with LV windings
  - all enterprise LV busbar types
  - all enterprise LV feeder types
  - all enterprise LV circuit breakers, isolators or switches
- preparing, writing and checking switching sheets to do all of the following:
  - manage load
  - manage voltage
  - minimise losses
  - maximise network reliability
- checking all above types of switching instructions
- coordinating all above types of switching instructions
- calculating plant loading
- applying and administrating supervisory control and data acquisition (SCADA) or

enterprise-specific system
- analysis and diagnosis of system failure
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; and how they correlate and their functions
  - characteristics of a transmission, a distribution and a rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- control of generator systems for synchronisation of a LV genset encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator encompassing:
  - safety precautions specific to the synchronisation of gensets - safe working practices and procedures, and synchronising procedures
  - techniques in the installation of gensets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of LV load and assessing the appropriateness of the generator
  - operating a generator in parallel to a single LV job - overhead systems, indoor systems, customer installations and kiosk substations
- different types and function of distribution components encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
  - types, functions and characteristics of distribution components
  - safety policies and procedures precautions related to the handling and installing distribution components
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions

and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
    - techniques in analysing, planning, coordination and organising work for a safe outcome and according to statutory requirements and regulations
    - techniques in the effective utilisation of available resources
    - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
    - techniques in facilitating and coordinating the delivery and issuing of access authorities
    - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite; earth access authorities; safe working area; work to be carried out in confined space or in hazardous environment; specific outsourcing procedures; specific hazard identification, risk classification and management procedures; regulatory requirements, such as WHS/OHS and electrical safety
    - techniques in receiving and coordinating the cancellation of access authorities in readiness for restoration
    - methods of conducting audits on correct access authority procedures
    - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
    - issuing and receipt of operating agreements
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on LV
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- principles of isolation and tagging procedures associated with protection testing encompassing:
    - Commonwealth/state/territory legislation standards, codes, supply authority regulations and/or enterprise requirements associated with installation, maintenance, isolation and tagging procedures
    - requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
    - techniques in documenting isolations
    - techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
    - techniques in the installation and maintenance procedures protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- LV switching principles encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
    - requirements for the use of manuals, system diagrams/plans and drawings - types,

characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed

- LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures and earthing procedures
- personnel protective equipment (PPE) for LV switching

- LV system switching principles, including switching authorisation procedures, encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
  - requirements for the use of manuals, system diagrams/plans and drawings
  - types and characteristics of LV systems and equipment to be switched
  - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, and procedures for coordination of operations
  - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- LV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to LV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
  - operational forms, access authorities and hazard/risk assessments associated with LV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, air-break switches, disconnects, live line clamps, phasing sticks and phasing tester
  - operation of protection systems and substation equipment - fault levels and settings, types and applications, protection systems and substation equipment fault levels and settings, and types and applications
  - restrictions pertaining to LV switching equipment
  - procedures for the isolation of LV distributions main and working earths
  - earthing LV electrical apparatus practices and procedures for access authority issuing

- LV switching techniques
- operating switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

- preparation of a LV switching instruction encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, isolation points and earthing, and responsibilities of the switching operator
  - techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility for maintenance, including cleaning inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers, maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific switching diagrams and drawing encompassing:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and

catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- LV system load calculation principles encompassing:
    - structure of LV systems
    - ratings of LV system components
    - methods of determining load on LV systems
    - records of load on LV systems
    - effect of added load on LV mains - variation of current, voltage and power factor
    - load flow in parallel operation
    - enterprise-specific network coordination tools.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO007 Manage high voltage distribution and sub-transmission network demand

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the management of the switching of high voltage (HV) network components with due regard to the loadings and prevailing network constraints and includes scheduling of generators, VAR compensators, load shedding and non-essential loads in response to National Electricity Market Management Company (NEMMCO) or network requirements. It also includes voltage control equipment.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRSO003 Coordinate power system operations in a regulated energy market

UETDRSO011 Respond to discrete and interdependent protection operations

Distribution and Sub-transmission Pathway Unit Group

UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Transmission Pathway Unit Group

UETDRSO002 Coordinate high voltage transmission network

UETDRSO004 Develop and evaluate power systems transmission switching programs

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the management of HV distribution and sub-transmission network demand	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of HV distribution and sub-transmission network systems, are reviewed and determined
	1.2 Purpose of the management is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the management of the network

		demand are obtained or established with appropriate personnel
	1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief
	1.5	Testing parameters are established from organisational established procedures on policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the management of HV distribution and sub-transmission network demand	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Management of HV distribution and sub-transmission network demand decisions are made on the basis of safety and effective outcomes according to requirements

		and/or established procedures
	2.4	Mathematical models of the HV distribution and sub-transmission network demand are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of HV distribution and sub-transmission network demand is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the management of HV distribution and sub-transmission network demand	**3.1**	Final inspections of the network demand are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of the managed HV distribution and sub-transmission network demand documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO35 Manage high voltage distribution and subtransmission network demand.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO007 Manage high voltage distribution and sub-transmission network demand

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating at least three (3) system manipulations that encompass the following:
  - high voltage (HV) sub-transmission distribution network
  - transmission network manipulation to control loading on equipment
  - transformers with HV windings
  - HV busbars
  - HV isolators
  - HV switchgear (applicable to enterprise equipment)
- managing multiple switching instructions
- coordinating the status of access permits/authorities on HV network equipment
- ensuring network plant operates within design and regulatory requirements on a real time basis
- calculating line loading
- preparing and authorising HV distribution switching programs
- demonstrating application of supervisory control and data acquisition (SCADA) or equivalent
- analysing, diagnosing and reporting system failures
- calculating and analysing paralleling conditions on the interconnected HV system as applicable to the entity
- preparing, writing and checking switching sheets to undertake all of the following:
  - managing load
  - managing voltage
  - minimising loss
  - maximising system reliability
  - allowing safe network access for maintenance activities
  - allowing safe network access for construction activities

    - validating fault reports arising from system disturbances
- dealing with unplanned events on at least one (1) occasion,

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- enterprise-specific procedures and work practices relating to managing network demand encompassing:
    - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to managing network demand
    - requirements for the use of demand management manuals, system diagrams/plans and drawings
    - identifying and interpreting enterprise demand management procedures
    - techniques in applying enterprise demand management procedures
- effective management and communication encompassing:
    - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to assisting in effective management and communication
    - enterprise operational principles - workplace WHS/OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
    - relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to WHS/OHS training, methods of addressing barriers such as literacy and cultural differences, and provisions relating to WHS/OHS issue resolution
    - techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, range of support services and expertise available
    - techniques in managing relationships - identifying problems; methods of conflict resolution; methods of consultation, communication, negotiation and mentoring; and strategies for positive feedback
    - techniques in leadership in achieving enterprise strategic and operational plans
    - techniques in managing relationships under stress - stress management
- methodology used in writing enterprise-specific management reports encompassing:
    - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the writing enterprise-specific management reports
    - techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems, and storing and retrieving data from computer systems
    - relationship of management reports to enterprise policies and procedures - enterprise

structure and resources, workplace WHS/OHS and risk management enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures

- techniques in writing enterprise-specific management reports - methods used to disseminate information and facilitate enterprise requirements, document proformas, and compliance and legislative requirements to produce effective reports in the appropriate format.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation including, workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO008 Manage power systems network faults

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the management of single incident faults on electrical network plant to ensure prompt restoration of supply to affected customers.

Electrical network plant includes feeders, transformers and busbars from transmission to distribution voltages. The unit includes single incident faults ranging from simple (involving a single item and no loss of supply) to complex (involving multiple substations with extensive loss of supply). The unit also encompasses liaison with operating authorities and dispatching and managing field crews, as well as the monitoring of safe access to the network.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRSO003 Coordinate power system operations in a regulated energy market

UETDRSO009 Manage power systems transmission networks

UETDRSO010 Respond to complex power system protection operations

UETDRSO011 Respond to discrete and interdependent protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Generation/Transmission Pathway Unit Group

UETDRSO002 Coordinate high voltage transmission network

UETDRSO004 Develop and evaluate power systems transmission switching programs

Distribution and Sub-transmission Pathway Unit Group

UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

UETDRSO007 Manage high voltage distribution and sub-transmission network demand

Transmission Pathway Unit Group

UETDRSO002 Coordinate high voltage transmission network

UETDRSO004 Develop and evaluate power systems transmission switching programs

UETDRSO009 Manage power systems transmission networks

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the management of a network fault	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of network faults, are reviewed and determined
	1.2 Purpose of the management is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the management of network faults are obtained or established with appropriate personnel
	1.4 Identification and testing procedures are discussed with/directed to appropriate personnel in order to ascertain the occurrence of a network fault
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or

		established procedures
	1.12	Action plan is developed in accordance with requirements and established procedures
2 Carry out the management of a network fault	**2.1**	Action plan is initiated and continually monitored to ensure outcomes are being met
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the network fault solution in accordance with requirements and/or established procedures
	2.3	Network fault management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of network fault management procedures is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged, coordinated and evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards

	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the management of a network fault	**3.1**	Final inspection of the network is undertaken to ensure it complies with all requirements and report includes all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of network fault management documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO32 Manage power systems network faults.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO008 Manage power systems network faults

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- managing a network fault, including all of the following:
  - identifying a network fault by interpreting available alarms and event data
  - developing a plan to enable management of a network fault
  - implementing plans in order that the network be restored after a fault has occurred
  - effectively liaising with operating authorities and field crews to restore the network after a fault has occurred
  - documenting/debriefing actions upon restoration of the network
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- enterprise-specific procedures and work practices relating to fault restorations encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to fault restorations
  - requirements for the use of operational manuals, system diagrams/plans and drawings
  - identifying and interpreting enterprise operating procedures
  - techniques in the applying enterprise operating procedures
- use of fault information to analyse and develop optimal network restoration strategies encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations standards, codes and/or enterprise requirements applicable to the analysis of protection targeting

- requirements for the use of operational manuals, system diagrams/plans and drawings
- techniques in the collation of protection data
- techniques in the analysis and assessment of fault information – public, employee and protection equipment
- application methods of fault information to analyse and develop optimal network restoration strategies - public and employee safety, and enterprise reliability guidelines
- resource availability.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.
- relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO009 Manage power systems transmission networks

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the monitoring of extra-high voltage (EHV) transmission networks in real time. This includes voltage control and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and management of field repair crews to respond to and rectify abnormalities and liaison with other electrical authorities.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRSO003 Coordinate power system operations in a regulated energy market

UETDRSO011 Respond to discrete and interdependent protection operations

Distribution and Sub-transmission Pathway Unit Group

UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Transmission Pathway Unit Group

UETDRSO002 Coordinate high voltage transmission network

UETDRSO004 Develop and evaluate power systems transmission switching programs

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the management of transmission networks	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of transmission network systems, are reviewed and determined
	1.2 Purpose of the management of the transmission networks is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the management of transmission

		networks are obtained or established with appropriate personnel
	1.4	Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Testing parameters are established from organisational established procedures on policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the management of transmission networks	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the transmission network are used to analyse the

		effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of management processes is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the management of transmission networks	**3.1**	Final review of management processes is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of management procedure documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO41 Manage power systems transmission networks.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO009 Manage power systems transmission networks

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating on at least three (3) occasions the management of system manipulations encompassing:
  - extra-high voltage (EHV) transmission network
  - EHV network manipulation to control loading on equipment
  - transformers with EHV windings (if applicable to enterprise equipment)
  - EHV busbars
  - EHV isolators
  - EHV switchgear (applicable to enterprise equipment)
- undertaking all of the following:
  - writing switching instructions
  - checking switching instructions
  - coordinating switching instructions
  - calculating plant loading
  - preparing and authorising EHV switching programs
  - monitoring switching progress
  - monitoring the status of access permits/authorities on EHV network equipment
  - ensuring network plant operates within design and regulatory requirements on a real time basis
  - dispatching and communicating with field crews to respond/rectify system abnormalities
  - applying and administrating of supervisory control and data acquisition (SCADA) (if applicable to enterprise equipment)
  - analysing and diagnosing system failures
  - calculating and analysing network conditions on the interconnected EHV system
- monitoring and managing switching to:

  - manage load
  - manage voltage
  - minimise loss
  - maximise system reliability
  - allow safe network access for maintenance activities
  - allow safe network access for construction activities
  - validating fault reports arising from system disturbances
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements such as WHS/OHS and electrical safety
  - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- high voltage (HV) system switching principles, including switching authorisation procedures, encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
  - requirements for the use of manuals, system diagrams/plans and drawings
  - types and characteristics of HV systems and equipment to be switched

- procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
- techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures

- coordinating and directing switching instructions encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the coordination and directing of switching schedules instructions
  - relationship between the operating authorities and HV customers, and operating agreements
  - techniques in coordinating and directing HV and low voltage (LV) switching of electrical networks
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
  - responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
  - techniques in gathering, collating and confirming data on switching procedures
- HV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to HV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the HV switching operator
  - operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with HV overhead and substation equipment -

test instruments, sticks, interrupters and arc stranglers
    - HV switchgear – types, categories, application and operating capabilities
    - operation of HV overhead switching or indicating devices - fuses, disconnect fuses, load switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, air-breaks, switches, disconnects, live line clamps, phasing sticks and phasing tester
    - operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications
    - restrictions pertaining to HV switching equipment
    - procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing, and HV switching techniques
    - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- preparation of a HV switching instruction schedule encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, points of isolation and earthing locations (safety and working earths), and responsibilities of the switching operator
    - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, protection, control, metering, and alarm equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards,

equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO010 Respond to complex power system protection operations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the coordination of response to complex protection operations due to system faults. It includes planning, carrying out and completing the response to complex protection operations.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRSO003 Coordinate power system operations in a regulated energy market

UETDRSO009 Manage power systems transmission networks

UETDRSO011 Respond to discrete and interdependent protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Generation/Transmission Pathway Unit Group

UETDRSO002 Coordinate high voltage transmission network

UETDRSO004 Develop and evaluate power systems transmission switching programs

Distribution and Sub-transmission Pathway Unit Group

UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

UETDRSO007 Manage high voltage distribution and sub-transmission network demand

Transmission Pathway Unit Group

UETDRSO002 Coordinate high voltage transmission network

UETDRSO004 Develop and evaluate power systems transmission switching programs

UETDRSO009 Manage power systems transmission networks

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Plan response to complex protection operations	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of response to complex protection operations, are reviewed and determined
	1.2	Purpose of the response is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Established policies, procedures and specifications for the response are obtained or established with appropriate personnel
	1.4	Response to complex protection operations is discussed with and/or directed to appropriate personnel in order to ascertain the scope of the work/testing required
	1.5	Testing parameters are ascertained from established policies, procedures and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Need for relevant work permits is identified to coordinate the performance of work according to requirements and/or established procedures
	1.12	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
2 Carry out response to complex protection	**2.1**	Strategic plans are developed incorporating organisational initiatives in accordance with established

operations		procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Decisions concerning the response to complex protection operations are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements
	2.7	Testing of the decision to be implemented is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the response to complex protection operations	**3.1**	Final review of the response to complex protection operation is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the work
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper)

are finalised/commissioned

3.3 Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of the response to complex protection operation documents (electronic/paper) are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO50 Respond to complex power system protection operations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO010 Respond to complex power system protection operations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- developing and evaluating, on at least three (3) occasions, all of the following:
  - identifying complex relay operations by interpreting available alarms and event data
  - analysing and diagnosing system failures
  - evaluating response to complex relay operations
- describing control and alarms associated with complex protection systems
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- protection system types encompassing:
  - requirements of a protection scheme - relationship to primary system design, purpose of protection, safety of persons, protection of plant, system instability, system break up, loss of customers, loss of revenue, protection zones, restricted schemes, unrestricted schemes, duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity and reliability
  - components of a protection scheme - current transformers, potential transformers, summation current transformers, interposing transformers, multi-tapped transformers, all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor-based relays, gas relays, thermal sensors, hardwired communication, powerline carriers systems, microwave systems, fibre optic systems, need for isolation and need for interfacing
  - protection applied to buses - overload, differential, earth leakage, structure leakage, combined schemes and protection overlap

  - protection applied to transformers - biased differential, gas, winding temperature and oil temperature
  - protection applied to single/radial lines - overcurrent, earth leakage, slow earth leakage, distance, auto-reclose, sectionalising and over voltage
  - protection applied to interconnected lines - overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current comparison, distance, impedance, admittance and offset
- use of fault information to analyse and develop optimal network restoration strategies encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the analysis of protection targeting
  - requirements for the use of operational manuals, system diagrams/plans and drawings
  - techniques in the collation of protection data
  - techniques in the analyse and assessment of fault information – public, employee and protection equipment
  - application methods of fault information to analyse and develop optimal network restoration strategies - public and employee safety, and enterprise reliability guidelines
  - resource availability.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, relevant modelling tools, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, drawings and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRSO011 Respond to discrete and interdependent protection operations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the coordination of response to discrete and interdependent protection operations due to system faults.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Distribution and Sub-transmission Pathway Unit Group

UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Transmission Pathway Unit Group

UETDRSO002 Coordinate high voltage transmission network

UETDRSO004 Develop and evaluate power systems transmission switching programs

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan response to discrete/interdependent protection operations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of the switching program, are reviewed and determined
	1.2 Purpose of the response is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the response are obtained or established with appropriate personnel
	1.4 Response to discrete/interdependent protection operations are discussed with and/or directed to appropriate personnel in order to ascertain the scope of

		the work/testing required
	1.5	Testing parameters are ascertained from established policies, procedures and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Need for relevant work permits is identified to coordinate the performance of work according to requirements and/or established procedures
	1.12	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	1.13	Strategic plans are developed incorporating organisational initiatives in accordance with established procedures
2 Carry out response to discrete/interdependent protection operations	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	Decisions concerning the response to protection operations are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	Stakeholders/customers are kept informed of current status regarding plan progress and recent developments

	2.4 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.5 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements
	2.6 Testing of the decision to be implemented is undertaken according to requirements and established procedures
	2.7 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.8 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.9 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the response to discrete/interdependent protection operations	**3.1** Final review of the switching program is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the work
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are finalised/commissioned
	3.3 Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of switching program documents (electronic/paper) are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO48 Respond to discrete and interdependent protection operations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRSO011 Respond to discrete and interdependent protection operations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- developing and evaluating, on at least three (3) occasions:
  - identifying discrete/interdependent relay operations by interpreting available alarms and event data
  - analysing and diagnosing system failures
  - evaluating responses to discrete/interdependent relay operations
- describing control and alarms associated with discrete/interdependent protection systems
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations

- substations and power transformers encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers; operation under load/no-load conditions; types and basic operation of tap changing switches, including solid state types; and efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - characteristics of a reactors - description and purpose
- HV fault switching principles encompassing:
  - primary causes, effects and types of HV electrical faults
  - HV protection devices - main components, types, categories, applications and functions
  - basic principle of operation of HV system protection devices
  - protection coordination and protection zoning
  - HV feeder auto-reclosing suppression encompassing – function and application
  - circuit condition requirements and switching considerations when paralleling and separating HV feeders
- detailed operation and setting of discrete protection systems encompassing:
  - earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination and backup protection
  - overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination and backup protection
  - alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, and over temperature schemes
- detailed operation of interdependent protection systems encompassing:
  - overcurrent and earth leakage schemes, including intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
  - pilot wire and phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme and pilot supervisory techniques
  - load shedding, voltage control, parallel operation and load rejection
  - busbar protection and circuit breaker failure protection
  - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, personal protective equipment (PPE), relevant modelling tools, and computerised electrical plant control and monitoring facilities currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, drawings, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO004 Inspect and maintain transmission overhead network

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit consolidates critical knowledge and skills developed throughout the term of the qualification to inspect and maintain transmission overhead network in the electricity supply industry (ESI).

It includes inspection and maintenance of de-energised and isolated transmission overhead network in accordance with workplace requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

CPCCLDG3001 Licence to perform dogging

CPCCLRG3001 Licence to perform rigging basic level

TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTO005 Inspect transmission structures, conductors and hardware

UETDRTO006 Install and maintain transmission conductors

UETDRTO007 Install and maintain transmission structures and hardware

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect and maintain transmission overhead network	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7 Work permits are received and signed in accordance with workplace requirements
	1.8 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements

	1.9	Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.10	Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.11	Worksite is prepared in accordance with the work plan and workplace requirements
	1.12	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Inspect transmission overhead network	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools and equipment are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Transmission overhead network is inspected in accordance with work plan and workplace requirements
	2.7	Safe approach distances are maintained when the work is being performed
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Maintain transmission overhead network	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Lifting, working at heights and the use of plant, tools and equipment are carried out in accordance with

		workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements
	3.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	3.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	3.6	Working earths are installed in accordance with workplace requirements
	3.7	Transmission overhead network is maintained in accordance with work plan and workplace requirements
	3.8	Safe approach distances are maintained when the work is being performed
	3.9	All earths are removed and work permits signed off and transmission overhead network re-energised in accordance with workplan and workplace requirements
	3.10	Incidents or unplanned events are responded to in accordance with workplace requirements
	3.11	Quality checks of work are undertaken in accordance with work plan and workplace requirements
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP99 Test and verify transmission overhead installations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO004 Inspect and maintain transmission overhead network

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- undertaking inspections of transmission overhead network using at least two (2) of the following methods:
  - visual
  - infra-red camera
  - X-ray
  - camera
  - binoculars/telescope
  - remotely piloted aircraft (RPA)
  - thermographic
- maintaining transmission overhead network including:
  - insulators (strains/termination and suspension)
  - bolts
  - structural components
- installing working earths in accordance with workplace requirements
- undertaking work activities from at least one (1) of the following:
  - elevated work platform (EWP)
  - temporary work platform
  - structure

- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice, and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of work permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods
- inspection procedures
- maintenance procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for inspecting and maintaining transmission overhead network
- network construction and network supply standards
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO005 Inspect transmission structures, conductors and hardware

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to inspect transmission structures, conductors and hardware in the electricity supply industry (ESI).

It includes the inspection of transmission poles and towers, conductors, underground and overhead transition points, hardware and earthing systems in accordance with work plan and workplace requirements.

It also includes the completion of inspection reports and other relevant documentation in accordance with requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for the inspection of transmission structures, conductors and hardware	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Liaison and communication with stakeholders is carried out in accordance with workplace requirements
2 Carry out inspection of transmission structures, conductors and hardware	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Working at heights and use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Inspection of structures, conductors and hardware is carried out in accordance with the work plan and workplace requirements
	2.5 Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1** Completed work is checked for compliance against the work plan and workplace requirements
	3.2 Incidents or unplanned events are reported in accordance with workplace requirements

3.3 Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements

3.4 Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements

3.5 Work permits are completed in accordance with workplace requirements

3.6 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP30 Inspect transmission overhead structures and electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO005 Inspect transmission structures, conductors and hardware

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- organising and completing relevant work permits in accordance with workplace requirements
- undertaking inspections of structures, conductors and hardware using at least two (2) of the following methods:
  - visual
  - infra-red camera
  - X-ray
  - camera
  - binoculars/telescope
  - remote piloted aircraft (RPA)
  - thermographic
- recording inspection results in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS

    - safe approach distances
    - construction design clearances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- deterioration of structures, conductors and hardware, including:
    - relationship between steel, concrete and other materials
    - deterioration in steel and concrete
    - inspection procedures for deterioration
- inspection methods and techniques for:
    - below ground
    - ground level
    - above ground
    - reporting.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used for inspecting transmission structures, conductors and hardware
- applicable documentation, including workplace requirements, relevant industry standards, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO006 Install and maintain transmission conductors

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain transmission conductors in the electricity supply industry (ESI).

It includes installing and maintaining de-energised and isolated conductors and hardware used on towers and poles, including stringing, tensioning, terminating and performing the electrical connections.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

CPCCLRG3001 Licence to perform rigging basic level

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTO007 Install and maintain transmission structures and hardware

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for installation and maintenance of transmission conductors	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.7 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.8 Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.9 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.10 Work permits are received and signed in accordance with workplace requirements
	1.11 Worksite is prepared in accordance with the work plan and workplace requirements
	1.12 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out installation of	**2.1** Legislation, regulations, standards, codes of practice and

transmission conductors		organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Working earths are installed in accordance with workplace requirements
	2.8	Conductors are strung, tensioned and terminated in accordance with workplace requirements
	2.9	Conductor hardware is installed in accordance with workplace requirements
	2.10	Electrical connections are made in accordance with the workplace requirements
	2.11	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.12	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Carry out maintenance of transmission conductors	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	3.3	Hazard control measures are monitored in accordance with workplace requirements

	3.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	3.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	3.6	Safe approach distances are maintained when the work is being performed
	3.7	Working earths are installed in accordance with workplace requirements
	3.8	Conductors are repaired and/or replaced in accordance with workplace requirements
	3.9	Conductor hardware is replaced in accordance with workplace requirements
	3.10	Electrical connections are made in accordance with the workplace requirements
	3.11	Incidents or unplanned events are responded to in accordance with workplace requirements
	3.12	Quality checks of work are undertaken in accordance with work plan and workplace requirements
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.6	Working earths are removed in accordance with workplace requirements
	4.7	Work permits are signed off in accordance with workplace requirements

4.8 Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP29 Install and maintain transmission overhead conductors and cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO006 Install and maintain transmission conductors

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- installing and maintaining conductor
- working from at least two (2) of the following:
  - hook ladder*
  - elevated work platform (EWP)
  - portable platform
  - gondola
  - conductor trolley
  - helicopter
  - elevated work box (EWB)
  - (*must do)
- using at least five (5) of the following stringing equipment:
  - crimping equipment
  - conductor winches
  - lever hoist
  - conductor trailers/jinker
  - pre-formed splices
  - conductor drum stands
  - draw wire
  - rollers/sheaves

  - conductor grip
  - conductor stockings
  - swivels
- creating an equipotential zone in accordance with workplace requirements
- using testing equipment in accordance with workplace requirements
- using tensioning/sagging equipment in accordance with workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice, and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - working earths
- hazard, risk assessment and risk control requirements
- potential hazards, including:
  - induced voltages
  - currents
- types and application of PPE
- conductor types and characteristics
- conductor clearances
- stringing methods
- conductor protective hardware, including:
  - types and selection of common dampers, tools and equipment
  - control of Aeolian vibration
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for installing and maintaining transmission conductors
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO007 Install and maintain transmission structures and hardware

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to install and maintain transmission structures and hardware in the electricity supply industry (ESI).

It includes the installation and maintenance of de-energised and isolated transmission poles, towers and hardware in accordance with work plan, drawings and workplace requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

CPCCLRG3001 Licence to perform rigging basic level

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain transmission structures and hardware	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks are assessed and control measures identified and applied
	1.6 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.7 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.8 Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.9 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.10 Work permits are received and signed in accordance with workplace requirements
	1.11 Worksite is prepared in accordance with the work plan and workplace requirements
	1.12 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out the installation	**2.1** Legislation, regulations, standards, codes of practice and

of transmission structures and hardware		organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed in accordance with workplace requirements
	2.7	Transmission structures and hardware are assembled and installed in accordance with construction plans, drawings and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Carry out the maintenance of transmission structures and hardware	**3.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	3.2	Working earths are installed in accordance with workplace requirements
	3.3	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	3.4	Hazard control measures are monitored in accordance with workplace requirements
	3.5	Safety observer is positioned to observe the work in accordance with workplace requirements
	3.6	Communication methods between workers and safety

		observer are used in accordance with workplace requirements
	3.7	Safe approach distances are maintained when the work is being performed
	3.8	Maintenance of structure and hardware is carried out in accordance with the work plan and workplace requirements
	3.9	Incidents or unplanned events are responded to in accordance with workplace requirements
	3.10	Quality checks of work are undertaken in accordance with work plan and workplace requirements
4 Complete work and documentation	**4.1**	Completed work is checked for compliance against the work plan and workplace requirements
	4.2	Incidents or unplanned events are reported in accordance with workplace requirements
	4.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	4.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	4.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	4.6	Work permits are signed off in accordance with workplace requirements
	4.7	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is not equivalent to UETTDRTP26 Install transmission structures and associated hardware and UETTDRTP27 Maintain transmission structures and associated hardware.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO007 Install and maintain transmission structures and hardware

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- installing at least two (2) types of structures
- installing all of the following hardware:
  - insulators
  - bolts
  - structural components
- maintaining at least two (2) types of structures
- maintaining at least two (2) types of hardware
- replacing at least two (2) of the following insulators:
  - strains/termination
  - suspension
  - post
  - V strings
- installing working earths in accordance with workplace requirements
- installing temporary work platform
- dealing with an unplanned event on at least one (1) occasion
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - transmission voltages
  - working earths
- hazard, risk assessment and risk control requirements, including potential hazards of:
  - induced voltages
  - currents
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- construction manuals, system diagrams/plans and drawings
- role and responsibilities of a safety observer
- types and location of structures
- types and function of hardware
- types and function of insulators
- types of foundations
- structure stabilisation methods
- calculation of conductor forces
- temporary work platforms
- conductor protective hardware, including:
  - types and selection of common dampers, tools and equipment
  - control of Aeolian vibration
- third-party assets used on transmission structures, e.g., mobile communication antenna.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic

and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for the installation and maintenance of transmission structures and hardware
- applicable documentation, including workplace requirements, relevant industry standards, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO008 Install/maintain overhead transmission network infrastructure

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the erection of non-energised, pyramid, delta, Pi or enterprise-specific transmission towers and associated hardware and includes installation and maintenance of poles and/or structures and associated hardware and the installation and maintenance of overhead conductors and cables used on towers. It encompasses the erection of components in accordance with construction plans, specifications, work orders and standing enterprise requirements. Erection also involves cleaning and welding.

It also encompasses maintenance work associated with the diagnosing of faults, the conducting of visual inspections, the confirmation of phasing and the completion of other enterprise tests on overhead conductors and cables. It also encompasses confirming isolation of systems and circuits, and accepting/issuing electrical permits. The updating of system data, records and/or completion of relevant documentation in accordance with enterprise requirements also forms part of this competency.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan for the installation and maintenance of transmission network	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection

infrastructure

1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the installation and maintenance of transmission network infrastructure are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel

1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures

1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures

1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order

1.8 Relevant personnel at worksite are confirmed current in first aid, tower/pole top rescue and other related work procedures according to requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved to carry out work, where necessary

1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures

1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures

	1.12	Traffic management plan is identified and implemented
2 Carry out the installation and maintenance of transmission network infrastructure	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and currency according to requirements confirmed
	2.3	Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures
	2.4	Essential knowledge and associated skills are applied in the safe installation and maintenance of transmission network infrastructure to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Poles and/or structures and their associated hardware to be installed are stabilised according to requirements
	2.6	Installation of poles and/or structures is carried out in accordance with the work schedule and requirements/established procedures
	2.7	Towers and associated hardware to be erected are stabilised according to requirements
	2.8	Maintenance, including repair and/or replacement of poles and/or structures, is carried out in accordance with the work schedule and requirements/established procedures
	2.9	Overhead conductor/cables are strung, tensioned and terminated in accordance with requirements/established procedures
	2.10	Conductors and anti-vibration devices, spaces/spreaders are secured in accordance with established procedures
	2.11	Electrical connections are made in accordance with requirements/established procedures
	2.12	Maintenance, including repair and/or replacement of

		overhead conductors and cables used on towers, is carried out in accordance with the work schedule and requirements/established procedures
	2.13	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks reported to immediate authorised personnel for directions according to established procedures
	2.14	Erection of towers and associated hardware is carried out in accordance with the work schedule and requirements/established procedures
	2.15	Unplanned events in the erection of towers and associated hardware are undertaken within the scope of established procedures
	2.16	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.17	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation and maintenance of transmission network infrastructure	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures
	3.5	Relevant work permits are signed off and the transmission network infrastructure is returned to service in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are finalised and processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP34 Install/maintain overhead transmission network infrastructure.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO008 Install/maintain overhead transmission network infrastructure

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- installing and maintaining at least one (1) of the following:
  - wood pole/structure
  - steel pole/structure
  - concrete pole/structure
  - composite pole/structure
- incorporating at least three (3) of the following hardware:
  - insulators
  - cross-arm braces
  - cross-arms
  - pole steps
  - shackle straps
  - earth leads
  - traction supports
  - traction registration
  - bonding
- incorporating at least one (1) of the following:
  - baulking
  - stays
  - concreting, including foundation
- incorporating at least one (1) of the following:
  - crane
  - auger/erector
  - ‘A’ frame

  - lifting beam
  - pole pikes
  - helicopter lift
- erecting one (1) of the following towers:
  - pyramid
  - delta pi
  - enterprise-specific type
- incorporating at least two (2) of the following:
  - insulators
  - clamps
  - bolts
  - structural components
- using at least one (1) of the following methods:
  - welding
  - cleaning
- installing and maintaining at least one (1) of the following conductor types:
  - copper
  - aluminium
  - steel
  - composite
  - aluminium/steel reinforced
  - pilot
- incorporating at least two (2) of the following access equipment:
  - elevated work platform (EWP)
  - portable platform
  - gondola
  - hook ladder*
  - elevated work box
  - (*must do)
- incorporating at least five (5) of the following:
  - winches*
  - tension equipment*
  - stringing equipment
  - cable trailers
  - crimping equipment *
  - pre-formed splices
  - hardware
  - cable drum stands
  - ropes

  - rollers/ sheaves
  - comealongs
  - swivels
  - (*must do)
- incorporating at least two (2) of the following:
  - voltage/de-energised indicating device
  - field intensity meter
  - operating rods
  - (*must do)
- incorporating at least one (1) of the following methods to tension overhead conductors:
  - dynamometer
  - site board
  - abney level
  - sag chart*
  - theodolite
  - (*must do)
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- mathematical techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
  - identification of basic concepts, principles and applications - application of velocity, acceleration, force, density, torque and pressure
  - applications of the International System of Units (SI) units
  - the relationship between work, power and energy
  - behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
  - fundamentals of the basic laws of fluid mechanics
- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications - properties of tensile strength; effects of temperature on the expansion of metals; ductility, malleability, work hardening and annealing; and the

conditions that lead to corrosion and the properties of timbers

- basic rigging techniques encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with rigging, including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safe use of rigging equipment, tools and associated equipment - types, techniques and application
  - site inspection procedures - identifying hazards, assessing and controlling risks, appropriate sequence of loading and unloading
  - determining the mass and dimensions of load
  - selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan); ratings of wire ropes and slings; removing, repairing and replacing damaged parts
  - techniques for assembling and erecting power winches and capstans
  - checking the integrity of support structure - visual inspection of load connections
  - techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods; codes of practice/compliance, enterprise and Commonwealth/state/territory legislative requirements; weather conditions; erection of safety nets and lines; methods of fixing and anchoring loads; and load stability
- procedures in providing store support encompassing:
  - classification and identification of equipment, components and tools
  - procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security and bookkeeping/record keeping
  - material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks and forklifts, and cable drum handling equipment
  - safety procedures - storage and care of safety equipment, handling hazardous materials, storage of hazardous substances and dangerous goods, and depot safety procedures
  - manufacturer and supplier information, including material safety data sheets (MSDS)
- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems; and radial, parallel and ring main feeders

- relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations

- substations, power transformers and reactors encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation of equipment
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - description, purpose and characteristics of a reactors
- installation of poles and or structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - characteristics and applications of different types of poles and associated hardware
  - techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, and clearances between conductors
  - safe methods of erecting and stabling poles and/or structures and cross-arms
  - techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles
  - methods of strengthen poles, maintenance and replacement of HV insulators and cross-arms
- transmission structures and hardware encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - types of structures
  - types and function of associated hardware/equipment and insulators
  - types of conductors
  - location of transmissions structures
  - other equipment used on transmission structures, e.g., aircraft warning devices
- procedures for routine maintenance on transmission structures and hardware encompassing:
  - procedures for gaining access permits
  - reasons for gaining access

- types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the transmission supply authority
- erecting and removing of transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system, and construction of a square rigging system
- procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, and calculation of conductor forces
- installation of temporary work platforms - types and function of installation tools and equipment, precautions and work methods to follow, and procedures for installations of temporary work platforms
- installation of conductor protective hardware - types and selection of common dampers, tools and equipment, control of Aeolian vibration and procedures for the installation of dampers onto conductors
- dead line insulator washing - supply authority regulations, and procedures for washing de-energised transmission lines

- procedures for installation and maintenance on transmission lines, structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of transmission lines and associated equipment
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - minimum construction clearances for transmission lines and sag/tension requirements
  - construction types and structures used in transmission lines
  - types, sizes and characteristics of transmission conductors - aluminium conductors, steel reinforced and earthing conductors
  - types of electrical connections used to connect transmission conductors - compression termination and bolted termination
  - causes and effects of poor electrical connections
  - types and application of specialised tools, equipment and hardware for the stringing of transmission conductors
  - techniques for stringing, tensioning and terminating transmission conductors
  - techniques for installation of associated hardware used on transmission towers
  - techniques for maintenance of damage transmission conductors - repair and replacement
- safe working practices and procedures for the installation of overhead transmission conductors encompassing:
  - limits of approach for personnel, vehicles, mobile plant and EWP
  - requirements of persons prior to making bare hand contact with dead low voltage (LV) mains and apparatus
  - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
  - safe working practices - requirements to enable safe working on conductive poles; procedures to attach an on-site earthing device to de-energised LV and HV overhead circuit; safe working practices when working with associated hardware/equipment and

insulators; precautions of voltages on transmission structures; dangers when working at heights; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures; and safe working practices when using specialised equipment
    - emergency response and rescue, including first aid
- powerline safety practices encompassing:
    - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
    - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from overhead conductors
    - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedures of climbing an overhead structure and fitting a pole chair
    - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, demonstration of the procedures used to provide an effective traffic management scheme and the use of a two-way radio
    - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; general fire prevention methods and the precautions for personal protection when fighting small fires
    - rescue victims from heights and confined spaces - planning and identifying procedures; establishing responses; developing techniques; involvement of external emergency services; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
    - requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic

and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO009 Install/maintain transmission network infrastructure electrical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the maintenance of non-energised, pyramid, delta, Pi or enterprise-specific transmission towers and associated hardware and the inspection requirements of overhead structures, such as towers and electrical apparatus. Overhead structures include towers and overhead conductors and/or cables, including underground and overhead transition points, electrical equipment, hardware and/or earthing systems.

This unit encompasses the repair and/or replacement of components in accordance with construction plans, specifications, work orders and standing enterprise requirements. Maintenance also involves cleaning and welding. The updating of system data, records and/or completion of relevant documentation in accordance with enterprise requirements also forms part of this competency.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTO008 Install/maintain overhead transmission network infrastructure

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to install and maintain transmission network infrastructure electrical equipment	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection

1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the installation and maintenance of transmission network infrastructure electrical equipment are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel

1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures

1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures

1.6 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order

1.7 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures

1.8 Relevant personnel at worksite are confirmed current in first aid, tower/pole top rescue and other related work procedures according to requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved to carry out work where necessary

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures

1.12 Traffic management plan is identified and implemented

2 Carry out the installation and maintenance of transmission network infrastructure electrical equipment	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Towers and associated hardware to be erected are stabilised according to requirements
	2.3	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and currency according to requirements confirmed
	2.4	Essential knowledge and associated skills are applied in the safe installation and maintenance of transmission network infrastructure electrical equipment to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.6	Inspection of overhead structures and electrical apparatus used on towers is carried out in accordance with the work schedule and requirements/established procedures
	2.7	Maintenance, including repair and/or replacement of towers, is carried out in accordance with the work schedule and requirements/established procedures
	2.8	Unplanned events in the erection of towers and associated hardware are undertaken within the scope of established procedures
	2.9	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.10	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation and maintenance of transmission network infrastructure electrical	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures

equipment

3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable

3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures

3.5 Relevant work permits are signed off and towers and associated hardware are returned to service in accordance with requirements

3.6 Work completion records, reports, as installed/modified drawings and/or documentation and information are finalised and processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP35 Install/maintain transmission network infrastructure electrical equipment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO009 Install/maintain transmission network infrastructure electrical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- maintaining one (1) of the following types of towers:
  - pyramid
  - delta pi
  - enterprise-specific type
- incorporating at least two (2) of the following:
  - insulators
  - clamps
  - bolts
  - structural components
- incorporating at least one (1) of the following maintenance tasks:
  - welding
  - cleaning
- inspecting at least four (4) of the following:
  - towers
  - overhead conductors/cables
  - structural fittings
  - electrical equipment
  - hardware
  - earthing systems
- incorporating at least two (2) of the following:
  - visual*
  - infra-red camera
  - X-ray

  - camera
  - binoculars/telescope
  - (* must do)
- incorporating all the following:
  - reporting procedures
  - reporting outcomes
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- procedures for routine maintenance on transmission structures and hardware encompassing:
  - procedures for gaining access permits
  - reasons for gaining access
  - types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the transmission supply authority
  - erecting and removing of transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system and construction of a square rigging system
  - procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, and calculation of conductor forces
  - installation of temporary work platforms - types and function of installation tools and equipment, precautions and work methods to follow, and procedures for installations of temporary work platforms
  - installation of conductor protective hardware - types and selection of common dampers, tools and equipment; control of Aeolian vibration and procedures for the installation of dampers onto conductors
  - dead line insulator washing - supply authority regulations, and procedures for washing de-energised transmission lines
- inspection of towers and structures used for transmission lines encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - characteristics of materials used for towers structures within the electrical transmission system - faults that occur that influence the integrity of the structure
  - deterioration prevention techniques - relationship between steel and other materials, inspection procedures for deterioration and deterioration prevention procedures in steel
  - procedures for the repair of deterioration in steel
- inspection of transmission lines encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - clearances and safety procedures
  - ground line inspection procedures of electrical transmission lines - requirements for inspection of transmission lines and insulators, use of specific equipment and testing

devices during testing/inspection, techniques in transmission line inspection and methods of recording data
    - overhead line inspection procedures of electrical transmission lines - methods and requirements for overhead line inspection on electrical structures, clearances for overhead conductors, cables and structures, techniques used to obtain close inspection of transmission lines, and use of specific equipment and testing devices during testing/inspection
    - methods of recording data
- powerline safety practices encompassing:
    - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
    - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from overhead conductors
    - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedures of climbing an overhead structure and fitting a pole chair
    - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, procedures used to provide an effective traffic management scheme and the use of a two-way radio
    - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
    - rescue victims from heights and confined spaces - planning and identifying procedures; establishing responses; developing techniques; involvement of external emergency services; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
    - requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO010 Maintain energised transmission lines using barehand techniques from a helicopter

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to maintain energised transmission lines using barehand techniques from a helicopter in the electricity supply industry (ESI).

It includes the calculation of physical loads and the use and maintenance of specialised tools and equipment, live work authorities/permits and disabling the automatic re-closing device.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UETDRTO012 Maintain energised transmission lines using live work stick techniques

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain energised transmission	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to

lines from a helicopter		be performed are referred to and confirmed
	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4	Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5	Hazards are identified, risks assessed and control measures identified and applied
	1.6	Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.7	Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.8	Minimum approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.9	Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.10	Work permits are received and signed in accordance with workplace requirements
	1.11	Auto-reclose devices and associated circuits are rendered inoperative in accordance with workplace requirements
	1.12	Worksite is prepared in accordance with the work plan and workplace requirements
	1.13	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Perform maintenance of energised transmission lines from a helicopter	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Working at heights and the use of tools, equipment and PPE are carried out in accordance with workplace requirements

	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Minimum approach distances are maintained when the work is being performed
	2.5	Energised overhead electrical transmission apparatus is maintained in accordance with the work plan and workplace requirements
	2.6	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.7	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are signed off in accordance with workplace requirements
	3.7	Works records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector

Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP33 Maintain energised transmission lines using Barehand technique on a helicopter platform.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO010 Maintain energised transmission lines using barehand techniques from a helicopter

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - minimum approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- inspecting, fitting and testing conductive suit
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- calculating conductor load
- installing a working platform
- applying helicopter safety procedures
- confirming the electrical integrity of insulators
- completing at least three (3) of the following tasks using live work barehand techniques from a helicopter:
  - replacing/installing vibration damper
  - replacing/installing conductor spacers
  - replacing/installing conductor joint
  - replacing/installing helical repair splice
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - minimum approach distances
  - working on energised lines utilising live work barehand techniques from a helicopter
  - helicopter safety procedures
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods
- roles and responsibilities of team members
- electrical and electrostatic principles, including:
  - relationship of the resistance of a human body to different levels of current and voltage
  - relationship of a human body to an electric field
  - effects of electrostatic induction
  - relationship of phase voltage and respective line voltages
  - effect of distance
  - potential of an object within the field and the effect of distances to the potential
  - Faraday's cage - effects of a body, advantages, description of the Faraday's cage used by barehand live line workers
  - lighting and switching surges
- application and function of extra-high voltage (EHV) auto-reclosing suppression
- testing, types, selection, maintenance and storage of specialised equipment:
  - conductive suit
  - tools
  - PPE
  - insulating sticks
- pilot briefing requirements:
  - emergency response and rescue
- techniques for working barehand on energised transmission lines from a helicopter
- requirements for aerial linework, including:
  - planning, establishing and implementing relevant aviation authority clearances
  - determining system requirements
  - aircrew familiarisation with network operations and equipment

  - effective communication
- electrical integrity of insulators including:
  - visual and audible assessment
  - disc voltage difference
  - condition of insulator string.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- materials, tools, equipment and PPE currently used for maintaining energised transmission lines using barehand techniques from a helicopter
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO011 Maintain energised transmission lines using live work barehand techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to maintain energised transmission lines using live work barehand techniques in the electricity supply industry (ESI).

It includes the calculation of physical loads and the use and maintenance of specialised tools and equipment, live work authorities/permits and disabling the automatic re-closing device.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UETDRTO012 Maintain energised transmission lines using live work stick techniques

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain energised transmission	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to

lines		be performed are referred to and confirmed
	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4	Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5	Hazards are identified, risks assessed and control measures identified and applied
	1.6	Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7	Work permits are received and signed in accordance with workplace requirements
	1.8	Auto-reclose devices and associated circuits are rendered inoperative in accordance with workplace requirements
	1.9	Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.10	Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.11	Minimum approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.12	Worksite is prepared in accordance with the work plan and workplace requirements
	1.13	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Perform maintenance of energised transmission lines	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements

	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Minimum approach distances are maintained when the work is being performed
	2.7	Energised overhead electrical transmission apparatus is maintained in accordance with the work plan and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are signed off in accordance with workplace requirements
	3.7	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP32 Maintain energised transmission lines using high voltage live work Barehand method.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO011 Maintain energised transmission lines using live work barehand techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - minimum approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- inspecting, fitting and testing conductive suit
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- calculating conductor load
- accessing work zone using at least two (2) of the following methods:
  - insulated ladder
  - elevated work platform (EWP)
  - elevated work box (EWB)
  - rope
- confirming the electrical integrity of insulators
- completing at least three (3) of the following tasks using live work barehand techniques:
  - replacing strain insulators*
  - replacing/connecting bridge/bonding connections*
  - replacing suspension insulators
  - replacing vibration dampers
  - repairing/replacing conductor spacers
  - repairing/replacing conductor joints
  - repairing conductors
  - (*must do)

- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - minimum approach distances
  - working on energised lines utilising live work barehand techniques
  - emergency response and rescue procedures
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods
- roles and responsibilities of team members
- calculation of forces supported by live working equipment
- electrical and electrostatic principles, including:
  - relationship of the resistance of a human body to different levels of current and voltage
  - relationship of a human body to an electric field
  - effects of electrostatic induction
  - relationship of phase voltage and respective line voltages
  - effect of distance
  - potential of an object within the field and the effect of distances to the potential
  - Faraday's cage - effects of a body, advantages, description of the Faraday's cage used by bare hand live-line workers
  - lighting and switching surges
- application and function of extra-high voltage (EHV) auto-reclosing suppression
- testing, types, selection, maintenance and storage of specialised equipment:
  - conductive suit
  - insulated boom EWP
  - plant and tools
  - PPE
  - ropes

    - sticks
- live work barehand techniques for maintaining energised transmission lines in accordance with workplace requirements
- electrical integrity of insulators, including:
    - visual and audible assessment
    - disc voltage difference
    - condition of insulator string.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- materials, tools, equipment and PPE currently used for maintaining energised transmission lines using live work barehand techniques
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO012 Maintain energised transmission lines using live work stick techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to maintain energised transmission lines using live work stick techniques in the electricity supply industry (ESI).

It includes the calculation of physical loads and the use and maintenance of specialised tools and equipment, live work authorities/permits and disabling the automatic re-closing device.

This unit is subject to the following requirements for entry:

- *Certificate III in ESI - Transmission Overhead powerline worker qualification or equivalent*.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Not applicable, refer to unit application.

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Plan to maintain energised transmission lines	**1.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4	Plant, tools, equipment, and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5	Hazards are identified, risks assessed and control measures identified and applied
	1.6	Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.7	Work permits are received and signed in accordance with workplace requirements
	1.8	Auto-reclose devices and associated circuits are rendered inoperative in accordance with workplace requirements
	1.9	Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.10	Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.11	Minimum approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.12	Worksite is prepared in accordance with the work plan and workplace requirements
	1.13	Traffic management is confirmed as being in place in accordance with workplace requirements
2 Carry out the maintenance of energised transmission lines	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored

	2.2	Lifting, working at heights and use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Minimum approach distances are maintained when the work is being performed
	2.7	Energised overhead electrical transmission apparatus is maintained in accordance with the work plan and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are signed off in accordance with workplace requirements
	3.7	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP31 Maintain energised transmission lines using high voltage live work stick method.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO012 Maintain energised transmission lines using live work stick techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - minimum approach distances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- confirming safety observer is in position in accordance with workplace requirements
- determining communication method with safety observer
- calculating conductor load
- accessing work zone using at least two (2) of the following methods:
  - insulated ladder
  - elevated work platform (EWP)
  - elevated work box (EWB)
  - structure
- confirming the electrical integrity of insulators
- replacing at least one (1) of the following:
  - strain insulators
  - suspension insulators
  - post insulators
- completing at least two (2) of the following tasks using live work stick techniques:
  - replacing/installing vibration dampers
  - repairing/replacing conductor spacers
  - repairing/replacing conductor fittings and hardware
  - applying pre-formed helical fittings
  - replacing cross-arms

- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - minimum approach distances
  - working on energised lines for voltages from 66 kV utilising live work stick techniques
  - emergency response and rescue procedures
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods
- roles and responsibilities of team members
- calculation of forces supported by live working equipment
- electrical and electrostatic principles, including:
  - relationship of the resistance of a human body to different levels of current and voltage
  - relationship of a human body to an electric field
  - effects of electrostatic induction
  - relationship of phase voltage and respective line voltages
  - effect of distance
  - potential of an object within the field and the effect of distances to the potential
  - lighting and switching surges
- application and function of extra-high voltage (EHV) auto-reclosing suppression
- testing, types, selection, maintenance, storage of specialised equipment, including:
  - plant and tools
  - PPE
  - ropes
  - sticks
- live stick work techniques for maintaining energised transmission lines in accordance with workplace requirements
- electrical integrity of insulators, including:

- visual and audible assessment
- disc voltage difference
- condition of insulator string.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- materials, tools, equipment and PPE currently used for maintaining of energised transmission lines using live work stick techniques
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO015 Assemble and erect transmission structures

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 3.0.

Application

This unit involves the skills and knowledge required for the assembly and erection of transmission structures in the electricity supply industry (ESI).

It includes the assembly and erection of transmission structures in accordance with construction plans, drawings and workplace requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

CPCCLDG3001 Licence to perform dogging

CPCCLRG3001 Licence to perform rigging basic level

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL002 Comply with environmental requirements

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Prepare to assemble and erect transmission structures	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks are assessed and control measures identified and applied
	1.6 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.7 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.8 Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.9 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.10 Work permits are signed in accordance with workplace requirements
	1.11 Worksite is prepared in accordance with the work plan and workplace requirements
2 Carry out the assembly and erection of transmission structures	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements

	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed in accordance with workplace requirements
	2.7	Transmission structures are assembled and erected in accordance with construction plans, drawings and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete the work	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are signed off in accordance with workplace requirements
	3.7	Personnel are notified of work completion in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is not equivalent to UETDRTO002 Erect power systems transmission structures.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO015 Assemble and erect transmission structures

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 3.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS) requirements
  - safe approach distances
- identifying hazards; assessing risks; and identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- assembling transmission structure components
- erecting transmission structures
- dealing with an unplanned event on at least one (1) occasion
- signing on and off relevant work permits in accordance with workplace requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards of:
  - induced voltages
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident

- construction manuals, system diagrams/plans and drawings
- role and responsibilities of a safety observer
- types and location of structures
- structure stabilisation methods
- methods for assembly and erection of transmission structures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate tools, equipment and PPE currently used in industry to assemble and erect transmission structures
- applicable documentation, including workplace requirements, equipment specifications, standards and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO016 Install transmission structure hardware

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 3.0.

Application

This unit involves the skills and knowledge required for the installation of hardware used on transmission structures in the electricity supply industry (ESI).

It includes the installation of hardware on the transmission structures in accordance with construction plans and workplace requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

CPCCLDG3001 Licence to perform dogging

CPCCLRG3001 Licence to perform rigging basic level

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL002 Comply with environmental requirements

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Prepare to install transmission structure hardware	**1.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2	Work plan is obtained and confirmed in accordance with workplace requirements
	1.3	Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4	Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5	Hazards are identified, risks are assessed and control measures identified and applied
	1.6	Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.7	Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.8	Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.9	Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.10	Work permits are signed in accordance with workplace requirements
	1.11	Worksite is prepared in accordance with the work plan and workplace requirements
	1.12	Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out the installation of transmission structure hardware	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements

	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed in accordance with workplace requirements
	2.7	Transmission structure hardware is installed in accordance with construction plans, drawings and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete the work	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are signed off in accordance with workplace requirements
	3.7	Personnel are notified of work completion in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is not equivalent to UETDRTO001 Erect power systems transmission structure hardware.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO016 Install transmission structure hardware

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 3.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS) requirements
  - safe approach distances
- identifying hazards; assessing risks; and identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- installing all of the following hardware:
  - insulators
  - bolts
- dealing with an unplanned event on at least one (1) occasion
- signing on and off relevant work permits in accordance with workplace requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards of:
  - induced voltages
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident

- procedures for responding to an unplanned event or incident
- construction manuals, system diagrams/plans and drawings
- role and responsibilities of a safety observer
- types of transmission structure hardware
- methods for installation of transmission structure hardware.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate tools, equipment and PPE currently used in industry to install transmission structure hardware
- applicable documentation, including workplace requirements, equipment specifications, standards and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTO017 String overhead transmission conductors

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 3.0.

Application

This unit involves the skills and knowledge required for the stringing of overhead conductors with no electrical connections being made in the electricity supply industry (ESI).

It includes the preparation of a stringing site, use of stringing equipment and stringing overhead conductors prior to tensioning and terminating.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

CPCCLDG3001 Licence to perform dogging

CPCCLRG3001 Licence to perform rigging basic level

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRTO015 Assemble and erect transmission structures

UETDRTO016 Install transmission structure hardware

Competency Field

Transmission Overhead

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	**Performance criteria describe the performance needed to demonstrate achievement of the element.**
1 Prepare to string the overhead transmission conductors	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Materials required for work are determined and obtained in accordance with work plan and workplace requirements
	1.4 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.5 Hazards are identified, risks are assessed and control measures identified and applied
	1.6 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.7 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.8 Safe approach distances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.9 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.10 Work permits are signed in accordance with workplace requirements
	1.11 Worksite is prepared in accordance with the work plan and workplace requirements
	1.12 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Carry out stringing of	**2.1** Legislation, regulations, standards, codes of practice and

overhead transmission conductors		organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed in accordance with workplace requirements
	2.7	Stringing of overhead transmission conductors prior to terminating is performed in accordance with work plan, drawings and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete the work	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Incidents or unplanned events are reported in accordance with workplace requirements
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.4	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.5	Surplus materials are returned to storage or disposed of in accordance with workplace requirements
	3.6	Work permits are signed off in accordance with workplace requirements

3.7 Personnel are notified of work completion in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is not equivalent to UETDRTO013 Pre-tension stringing overhead transmission conductors and cables.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTO017 String overhead transmission conductors

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 3.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS) requirements
  - safe approach distances
- identifying hazards; assessing risks; and identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- creating an equipotential work zone
- stringing conductors
- using at least five (5) of the following stringing equipment:
  - crimping equipment
  - conductor winches
  - lever hoist
  - conductor trailers/jinker
  - pre-formed splices
  - conductor drum stands
  - draw wire
  - rollers/sheaves
  - conductor grip
  - conductor stockings
  - swivels
- dealing with an unplanned event on at least one (1) occasion
- signing on and off relevant work permits in accordance with workplace requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards of:
  - induced voltages
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- construction manuals, system diagrams/plans and drawings
- role and responsibilities of a safety observer
- conductor types and characteristics
- construction clearances
- stringing methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, equipment specifications, standards and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS001 Commission complex network protection and control systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the commissioning of network protection and control systems in complex situations and includes isolation, inspection, monitoring, testing, adjustment and repair, refurbishment and/or overhaul and functional checks. It includes schemes from discrete and interdependent schemes, such as distance, differential, transformer differential, bus zone, bus overcurrent, revenue metering, current transformer accuracy, supervisory control and data acquisition (SCADA), communications, harmonic control, point on wave and high voltage (HV) plant testing.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTS004 Commission interdependent network protection and control systems

UETDRTS010 Develop power systems secondary isolation instructional documents

UETDRTS015 Maintain complex network protection and control systems

UETDRTS017 Maintain interdependent network protection and control systems

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the commissioning of network protection and control systems (complex)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of network protection and control systems (complex), are reviewed and determined
	1.2 Purpose of the commissioning of network protection and control systems (complex) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the commissioning of network protection and control systems (complex) are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project

		brief
	1.5	Testing parameters are established from organisational established procedures and policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the commissioning of network protection and control systems (complex)	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Commissioning of network protection and control systems (complex) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the schemes are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures

2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

2.7 Testing of network protection and control systems (complex) is undertaken according to requirements and established procedures

2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures

2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements

2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards

2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures

3 Complete the commissioning of network protection and control systems (complex)

3.1 Final inspections of the network protection and control systems (complex) are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project

3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of the commissioning of network protection and control systems (complex) documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS36 Commission complex network protection and control systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS001 Commission complex network protection and control systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- commissioning of a protection and control system, including at least five (5) complex schemes
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- electrical equipment associated with protection and control schemes encompassing:
  - types and applications of electrical equipment – characteristics, capabilities (schemes: overcurrent, frame leakage, cooling, buchholz, direct current (d.c.) supplies, restricted earth, sensitive earth fault, circuit breaker fail, reclose, d.c. frame leakage, CEL fail, under frequency load shed and earth fault)
- principles of isolation and tagging procedures associated with protection testing encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
  - requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings

  - techniques in documenting isolations
  - techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
  - techniques in the installation and maintenance procedures protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- maintenance and commissioning procedures associated with discrete protection schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the maintenance and commissioning procedures
  - requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
  - techniques in maintenance and commissioning procedures – planning, policy and testing techniques
  - close out requirements
- relay manufacturer specifications encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of relay manufacturer specifications
  - requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
  - types, function and characteristics of specific relays - differences between specific relays used for the same functionality
- safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the handling and disposing of insulation or heat dissipation materials used in power distribution devices
  - identification of environmental issues associated with the handling and disposing of insulation materials
  - safety precautions when handling and disposing of heat dissipation materials - safe working practices; WHS/OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures; types and function of specialised equipment; safe working practices when using specialised equipment; and emergency response and rescue including first aid e
  - techniques in the handling and disposing of insulation materials - polychlorinated biphenyl (PCB), asbestos, insulating oil and sulphur hexafluoride (SF6) gas
- procedure to undertake a visual inspection of a scheme encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
  - requirements for the use of manuals, system diagrams/plans and drawings

- identifying obvious deficiencies in operating to the standard functionality
- techniques in determining relay malfunction - targeting
- techniques in determining wiring defects

- operation and maintenance procedures associated with discrete protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with operating procedures
  - requirements for the use of operating manuals, system diagrams/plans and drawings
  - techniques - gas collection and analysis, bleeding and resetting, calibration, operational and sensitivity checks, and trip and alarm checks
  - surge relay types and uses, including transformer main tanks and diverter switch chambers
- commissioning procedures associated with discrete protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements
- measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:
  - type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group and temperature
  - interpretation and analysis the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturer data and measurements
  - techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements
- principles of power transformer construction and operations encompassing:
  - applications of static reactive plant in HV networks, including voltage control, volt-ampere reactive (VAR) control and transient response capacity
  - types of static reactive plant, including HV capacitors, HV reactors, static VAR compensators (SVC) and combinations of these
  - operating characteristics and operational constraints, including point on wave switching issues
  - ratings, cooling systems and control systems and ancillary equipment used
  - configurations and system layout, including single star, double star and bridge type
  - typical protection systems used, including neutral unbalance current and neutral unbalance voltage
  - techniques used when balancing elements within static reactive plant
  - safety precautions when testing and maintaining HV static reactive plant - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS

risks; types, selection, maintenance and use of PPE

- types and applications of test equipment encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
  - types and applications of test equipment used on discrete protection scheme
  - techniques in the use of test equipment - electronic test equipment (Doble and Ohmnicrome), gas injection equipment, manufacturer test equipment, multimeters, phase angle meters and meggers
- detailed operation and setting of discrete protection systems encompassing:
  - earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination and backup protection
  - overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, current transformer summation, time graded discrimination and backup protection
  - alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, and over temperature schemes
- detailed operation of interdependent protection systems encompassing:
  - overcurrent and earth leakage schemes, including inter-tripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
  - pilot wire and phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme and pilot supervisory techniques
  - load shedding, voltage control, parallel operation and load rejection
  - busbar protection and circuit breaker failure protection
  - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking
- detailed operation of complex protection systems encompassing:
  - distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes and bus zone
  - differential, transformer differential and bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, current transformer connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, current transformer connections, special considerations and digital systems
  - types of revenue metering
  - applications of supervisory control and data acquisition (SCADA)
  - complex protection systems for communications
  - harmonic control
  - point on wave switching.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS002 Commission energy/revenue metering schemes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the commissioning of energy/revenue metering schemes. This includes isolation, inspection, monitoring, testing, adjustment, repair, refurbishment and/or overhaul and functional checks of revenue metering schemes. It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to tariff requirements.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage

electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTS012 Install and replace complex energy/revenue metering schemes and associated equipment

UETDRTS013 Install and replace high voltage metering and associated equipment

UETDRTS016 Maintain compliance with national electricity market metrology practices and procedures

UETDRTS020 Management of energy registration data errors for revenue billing purposes

UETDRTS022 Perform current injection testing using phantom load

UETDRTS024 Test and maintain energy/revenue metering schemes

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the commissioning of energy/revenue metering schemes	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of energy/revenue metering schemes,

		are reviewed and determined
	1.2	Purpose of the commissioning of energy/revenue metering schemes is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures, policies and specifications for the commissioning of energy/revenue metering schemes are obtained or established with appropriate personnel
	1.4	Commissioning of energy/revenue metering schemes procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Commissioning parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the commissioning of energy/revenue metering schemes	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures

2.2 First aid, rescue and other related work procedures are performed according to requirements and/or established procedures

2.3 Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements

2.4 Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures

2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures

2.6 Testing equipment is used in accordance with the work schedule and requirements and/or established procedures

2.7 Commissioning of energy/revenue metering schemes is carried out in accordance with the work schedule

2.8 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

2.9 Essential knowledge and associated skills are applied in the safe commissioning of revenue metering schemes to ensure completion in an agreed timeframe according to requirements

2.10 Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements

2.11 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards

3 Complete the commissioning of energy/revenue metering schemes

3.1 Final inspections of the commissioning of energy/revenue metering schemes using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project

3.2 Appropriate internal/external personnel are notified of

completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the commissioning of energy/revenue metering schemes, documents are issued and records updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS43 Commission energy/revenue metering schemes.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS002 Commission energy/revenue metering schemes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing, on at least three (3) occasions, the commissioning of the following metering schemes types:
  - single feeder high voltage (HV)
  - low voltage (LV) current transformer customer sites
- performing, on at least three (3) occasions, commissioning involving at least seven (7) of the following:
  - isolation
  - inspection
  - monitoring
  - testing
  - adjustment
  - repair
  - refurbishment and/or overhaul
  - functional checks of revenue metering schemes
- demonstrating, on at least three (3) occasions, knowledge and application of at least two (2) different manufacturer's:
  - proprietary software
  - application programming
  - interrogations
- undertaking, on at least three (3) occasions, the following:
  - calculations, including obtain final revenue multiplier
  - validation of meter pulse multiplier
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- commissioning techniques
- evaluation of the metering design and equipment accuracy to ensure suitability with national electricity market requirements
- recording nameplate details for all metering scheme components and ensuring compliance with the design accuracy class
- confirmation of instrument transformer connected ratios, polarities, burdens and voltage drops
- checking integrity of all wiring, connections and terminalisations
- ensuring cable types and sizes selected are correct
- phase sequence and vector relationships are correct
- documentation verifying the errors of current transformers and voltage transformers
- validation of meter data to verify the metering programming parameters, display and error functions are all correct in accordance with manufacturer specifications
- verifying meter programming to ensure the best possible resolution of energy data measurement and recording
- validating the interval data with the responsible person and/or meter data provider
- confirming remote communications with the metering is established and is of sufficient quality to support reliable communications and data transfer
- standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
- requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
- requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
- techniques in commissioning procedures – planning, policy and testing techniques
- close out requirements
- requirements for the use of meter manufacturer manuals, system diagrams/plans and drawings.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS003 Commission energy/revenue metering schemes (complex)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the commissioning of energy/revenue metering schemes in complex situations, including summation, subtraction, generation, bulk supply, interconnector and wholesale metering installations. This includes isolation, inspection, monitoring, testing, adjustment, repair, refurbishment and/or overhaul and functional checks of complex revenue metering schemes. It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to tariff requirements.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and

circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTS002 Commission energy/revenue metering schemes

UETDRTS012 Install and replace complex energy/revenue metering schemes and associated equipment

UETDRTS013 Install and replace high voltage metering and associated equipment

UETDRTS016 Maintain compliance with national electricity market metrology practices and procedures

UETDRTS020 Management of energy registration data errors for revenue billing purposes

UETDRTS022 Perform current injection testing using phantom load

UETDRTS024 Test and maintain energy/revenue metering schemes

UETDRTS025 Test and maintain energy/revenue metering schemes (complex)

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the commissioning of energy/revenue metering schemes (complex)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of energy/revenue metering schemes (complex), are reviewed and determined
	1.2 Purpose of the commissioning of energy/revenue metering schemes (complex) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the commissioning of energy/revenue metering schemes (complex) are obtained or established with appropriate personnel
	1.4 Commissioning of energy/revenue metering schemes (complex) procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Commissioning parameters are established from organisational established procedures, policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies

	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the commissioning of energy/revenue metering schemes (complex)	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Commissioning of energy/revenue metering schemes (complex) is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and

		preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the safe commissioning of energy/revenue metering schemes (complex) to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the commissioning of energy/revenue metering schemes (complex)	**3.1**	Final inspections of the commissioning of energy/revenue metering schemes (complex) using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of routine testing and acceptance testing procedures/activities/results, for the commissioning of energy/revenue metering schemes (complex), documents are issued and records updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS47 Commission energy/revenue metering schemes (complex).

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS003 Commission energy/revenue metering schemes (complex)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing, on at least three (3) occasions, the commissioning of at least seven (7) of the following complex metering scheme types:
  - multiple feeder high voltage (HV) and low voltage (LV) customers
  - summation
  - subtraction
  - interposing
  - voltage changeover schemes
  - generation
  - zone substation
  - bulk supply
  - interconnector
  - wholesale metering
- performing, on at least three (3) occasions, at least six (6) of the following activities:
  - isolation
  - inspection
  - monitoring
  - testing
  - adjustment
  - repair
  - refurbishment and/or overhaul
  - functional checks of complex revenue metering schemes
- performing, on at least three (3) occasions, all the following activities:
  - ensuring meter function using multiple proprietary software applications
  - determining energy flows, voltage, current and phasor relationships

  - validating against independent information sources and test results to ensure that the installation is operating within prescribed limits (enterprise, manufacturer and regulated energy market requirements)
  - validation of the actual meter energy data against meter data provider remote data streams
  - calculating and recording the overall installation site
  - ensuring compliance with regulated energy market compliance
  - endorsing the site overall accuracy and installation compliance as the technical representative authorised by the metering provider
  - ensuring all records of the commissioning of energy/revenue metering schemes (complex) are complete and forwarded to the appropriate authority in accordance with regulatory requirements
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- additional hardware components which add complexity and the possibility for greater uncertainty in overall accuracy
- calculations are more complex and require consideration of multiple sources of errors to accurately determine the overall site errors
- calculation and verification of correct application of transformer losses, transmission line losses and correction factors in meter programming
- determining the inputs and relationships required of physical metering points to establish and verify logical metering schemes
- consideration to all sources of burden on the metering instrument transformers and ensuring the instrument transformer is operating within its accuracy limits
- communicating with market participants, including meter data provider and responsible person
- knowledge of high fault currents
- risk assessments and safe systems of work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS004 Commission interdependent network protection and control systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package 2.0.

Application

This unit covers the commissioning of network protection and control systems in interdependent situations and includes isolation, inspection, monitoring, testing, adjustment and repair, refurbishment and/or overhaul and functional checks. It also includes schemes, such as circuit breaker fail, master-controlled earth fault, impedance and differential relays, inter-tripping, blocking, synchronising, pilot wire, phase comparison, load shedding, voltage control, parallel operation and load rejection. This includes commissioning of discrete and interdependent schemes.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTS010 Develop power systems secondary isolation instructional documents

UETDRTS017 Maintain interdependent network protection and control systems

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the commissioning of network protection and control systems (interdependent)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of network protection and control systems (interdependent), are reviewed and determined
	1.2 Purpose of the commissioning of network protection and control systems (interdependent) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the commissioning of network protection and control systems (interdependent) are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational

		established procedures and policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the commissioning of network protection and control systems (interdependent)	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Commissioning of network protection and control systems (interdependent) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the schemes are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate

		authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of network protection and control systems (interdependent) is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the commissioning of network protection and control systems (interdependent)	**3.1**	Final inspections of the network protection and control systems (interdependent) are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the commissioning of network protection and control systems (interdependent) documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS22 Commission interdependent network protection and control systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS004 Commission interdependent network protection and control systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating commissioning of a protection and control system involving at least five (5) of the following:
  - circuit breaker fail protection
  - master controlled earth fault
  - inter-tripping
  - blocking
  - synchronising
  - pilot wire
  - phase comparison
  - load shedding
  - voltage control protection
  - frame leakage
  - delta current
  - reverse power
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- commissioning procedures associated with discrete protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures

  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements
- principles of power transformer construction and operations encompassing:
  - applications of static reactive plant in high voltage (HV) networks, including voltage control, voltage-ampere reactive (VAR) control and transient response capacity
  - types of static reactive plant, including HV capacitors, HV reactors, static VAR compensators and combinations of these
  - operating characteristics and operational constraints, including point on wave switching issues
  - ratings, cooling systems and control systems and ancillary equipment used
  - configurations and system layout, including single star, double star and bridge type
  - typical protection systems used, including neutral unbalance current and neutral unbalance voltage
  - techniques used when balancing elements within static reactive plant
  - safety precautions when testing and maintaining HV static reactive plant - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE).

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals
- working at realistic heights above ground, i.e., above three metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS005 Commission power systems metering schemes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the commissioning of metering schemes and includes isolation, inspection, monitoring, testing and adjustment; and repair, refurbishment and/or overhaul and function checks on schemes including ammeters, voltmeters, wattmeters, volt-ampere reactive (VAR) meters and energy metering. It also includes an emphasis on ensuring that the metering is connected into the power system safely and correctly and that it returns valid information.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTS010 Develop power systems secondary isolation instructional documents

UETDRTS014 Maintain and test and metering schemes

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the commissioning of metering schemes	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of metering schemes, are reviewed and determined
	1.2 Purpose of the commissioning of metering schemes is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the commissioning of metering schemes are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the commissioning of metering schemes	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Commissioning of metering scheme decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the commissioning of metering schemes are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

	2.7 Testing of the commissioning of metering schemes is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the commissioning of metering schemes	**3.1** Final inspections of the commissioning of metering schemes are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of the commissioning of metering schemes documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector

Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS26 Commission power systems metering schemes.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS005 Commission power systems metering schemes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating commissioning metering schemes, on at least three (3) occasions, testing accuracy to established plans of at least three (3) schemes using the following equipment
  - ammeter
  - voltmeter
  - wattmeter
  - volt-ampere reactive (VAR) meter
  - energy meter*
  - (*Must do)
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- installation of metering and control equipment encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
  - types of meters - kilowatt-hour meters single and polyphase, demand meters, recording meters and electronic recording metering system summators
  - installation and removal methods - direct connection and plug in method, and enterprise specific
  - types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch and audio frequency injection relay
  - testing procedures - safety testing and polarity testing

- commissioning procedures associated with relevant equipment encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS006 Conduct evaluation of power system substation faults

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the procedure in evaluating power system incidents by following a process of downloading event and disturbance record information from protection relays. This includes interpreting items, such as alarms, relay targets, relay settings, event records, disturbance records and sequence of events records. It also encompasses the evaluation and/or investigation of relay operation, relay schemes functionality and relay settings.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy

management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the evaluation of power system events	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the evaluation of power system failures, are reviewed and determined
	1.2 Purpose of the evaluation of power system events are established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the evaluation of power system failures are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies

	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the evaluation of power system events	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Following evaluation of power system events, decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and /or engineering models of the evaluation of power system events are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of power system is undertaken according to requirements and established procedures

	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the evaluation of power system events	**3.1**	Final evaluation of all relevant data pertaining to the power system event is undertaken to ensure the recommendations comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the evaluation of power system event documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS23 Conduct evaluation of power system substation faults.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS006 Conduct evaluation of power system substation faults

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating at least two (2) downloads from protection relays or recording equipment from each of the following:
  - relay panel
  - remote location
- developing five (5) evaluation reports on power system events, including all of the following:
  - interpretation of targets in a substation
  - interpretation of fault reports
  - interpretation of downloaded event data
  - development of valid conclusions and recommendations
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management

systems
    - analysis of relevant data and evaluation of WHS/OHS system effectiveness
    - assess resources to establish and maintain WHS/OHS management systems
- power distribution network documentation encompassing:
    - requirements for the use of manuals, system diagrams/plans and drawings and for plans, such as work method statements for the control of WHS/OHS risks
    - types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different diagrams and documentation on low voltage (LV) and high voltage (HV) systems - overhead distribution extensions, underground distribution extensions, distribution substations and street lighting systems
- measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:
    - type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group and temperature
    - interpretation and analysis of the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturer data and measurements
    - techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements
- system components and layouts encompassing:
    - distribution system layouts - overhead/underground, urban/rural, HV customers, high-rise building systems, three phase lines, single phase lines, single wire earth return (SWER) systems, spur, parallel and ring systems, and typical substation types
    - transmission system layouts - lines, buses, transformers and cables; line/bus layouts, including single, double, ring and breaker and half systems, and HV crossing methods
- calculation of fault levels encompassing:
    - calculation of fault levels in symmetrical and asymmetrical fault conditions - types of faults, interconnected and radial systems, symmetrical components, representation of voltages and currents, sequence impedances of system plant, calculation/determination of sequence impedance networks, determination of operative sequence impedances, fault or arc impedances and first approximation techniques
    - interrupting device capabilities - determination of fault current breaking capability and let through energy capability of fuses and circuit breakers, direct current (d.c.) offset and transient condition effects
- protection system types encompassing:
    - requirements of a protection scheme - relationship to primary system design, purpose of protection, safety of persons, protection of plant, system instability, system break up, loss of customers, loss of revenue, protection zones, restricted schemes, unrestricted schemes, duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity and reliability

- components of a protection scheme - current transformers, potential transformers, summation current transformers, interposing transformers, multi-tapped transformers, all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor-based relays, gas relays, thermal sensors, hardwired communication, powerline carriers systems, microwave systems, fibre optic systems, need for isolation and need for interfacing
- protection applied to buses - overload, differential, earth leakage, structure leakage, combined schemes and protection overlap
- protection applied to transformers - biased differential, gas, winding temperature and oil temperature
- protection applied to single/radial lines - overcurrent, earth leakage, slow earth leakage, distance, auto reclose, sectionalising and over voltage
- protection applied to interconnected lines - overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current comparison, distance, impedance, admittance and offset

- detailed operation and setting of discrete protection systems encompassing:
  - earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination and backup protection
  - overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, current transformer summation, time graded discrimination and backup protection
  - alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, and over temperature schemes
- detailed operation of interdependent protection systems encompassing:
  - overcurrent and earth leakage schemes, including inter-tripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
  - pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme and pilot supervisory techniques
  - load shedding, voltage control, parallel operation and load rejection
  - busbar protection and circuit breaker failure protection
  - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking
- detailed operation of complex protection systems encompassing:
  - distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes and bus zone
  - differential, transformer differential and bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, current transformer connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, special considerations and digital systems
  - types of revenue metering
  - applications of supervisory control and data acquisition (SCADA)
  - complex protection systems for communications

- harmonic control
- point on wave switching.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals
- working at realistic heights above ground, i.e., above three metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS007 Conduct evaluation of power systems primary plant

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the commissioning and maintenance testing requirements for primary plant and equipment. It includes both the practical application of the tests and analysis of results, covering, but not limited to; applied high voltage (HV) testing and induced HV testing, ratio, polarity, winding resistance, impedance, dielectric loss angle, partial discharge and watts loss insulation resistance and transformer vector group. It encompasses a complete understanding of the nature of the tests being conducted and the ability to conduct the tests in a safe manner.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTS010 Develop power systems secondary isolation instructional documents

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the testing of primary plant	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing of primary plant systems, are reviewed and determined
	1.2 Purpose of the testing of primary plant is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the testing of primary plant are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the testing of primary plant	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Testing of primary plant decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the testing of primary plant are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

	2.7 Testing of primary plant is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the testing of primary plant	**3.1** Final inspections of the primary plant are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of the testing of primary plant documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS32 Conduct evaluation of power systems primary plant.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS007 Conduct evaluation of power systems primary plant

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing five (5) of the following tests on primary plant – transformers (note: at least two (2) (*) must be included):
  - *direct current (d.c.) high voltage (HV) tests
  - *alternating current (a.c.) HV tests
  - *induced HV tests
  - ratio tests
  - polarity tests
  - winding resistance tests
  - impedance tests
  - insulation resistance tests
  - transformer vector group tests
  - winding temperature indicator tests
  - alarm tests
  - neutral current transformer tests
- complete five (5) of the following tests on primary plant – circuit breakers (note: at least two (2) (*) must be included):
  - profiling and contact timing
  - *a.c. HV tests
  - function tests
  - minimum voltage operation tests
  - insulation resistance tests
  - contact resistance tests
  - auxiliary contact tests
  - alarm tests

- complete at least three (3) of the following tests on primary plant – capacitor banks:
  - cell capacitance measurement
  - neutral current transformer tests
  - balance tests
  - insulation resistance
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- detailed operation of fundamental test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence, and the use of oscilloscopes
- primary plant testing encompassing:
  - transformers - d.c. HV tests, a.c. HV tests, HV tests, ratio tests, polarity tests, winding resistance tests, impedance tests, insulation resistance tests, transformer vector group test, winding temperature indicator test, alarm tests and neutral current transformer tests
  - circuit breakers - d.c. HV tests, a.c. HV tests, induced HV tests, function tests, operation timing, minimum voltage operation test, insulation resistance test, contact resistance test, auxiliary contact test and alarm tests
  - capacitor banks - d.c. HV tests, a.c. HV tests, induced HV tests, neutral current transformer tests, balance tests and insulation resistance.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS008 Design power systems secondary isolation instructional documents

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the skills needed to design secondary isolations. This will involve analysis of tripping and a thorough understanding of secondary voltage and current, direct current (d.c.), alarm, metering and communication circuits. It also involves accurate communication of this information in a format acceptable to the operating or testing authority.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the design of secondary isolation instructional documents	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of secondary isolation instructional documents, are reviewed and determined
	1.2 Purpose of the design of secondary isolation instructional documents is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design of secondary isolation instructional documents are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to

		requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the design of secondary isolation instructional documents	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Design of secondary isolation instructional document decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the design of secondary isolation instructional documents are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within

		an agreed timeframe according to requirements
	2.7	Testing of the design of secondary isolation instructional documents is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the design of secondary isolation instructional documents	**3.1**	Final inspections of the design of secondary isolation instructional documents are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the design of secondary isolation instructional documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS30 Design power systems secondary isolation instructional documents.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS008 Design power systems secondary isolation instructional documents

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- designing secondary isolation instructional documents for at least four (4) of the following substation equipment:
  - bus protection
  - high impedance bus protection
  - feeder/line protection
  - transformer protection
  - earth fault protection
  - backup protection
  - pilot wire protection
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management

systems
- analysis of relevant data and evaluation of WHS/OHS system effectiveness
- assess resources to establish and maintain WHS/OHS management systems

- secondary switching/isolation principles and sheet preparation encompassing:
  - techniques in performing and demonstrating correct sequence of isolation and/or restoration - communication with appropriate authorities, ensuring adequate protection remains in service to provide plant protection, and reading and interpreting drawings for switching/isolating, sheet/instruction preparation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS009 Design testing and commissioning procedures for field devices and substations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the testing and commissioning procedures for new substation and field devices in accordance with design. This will involve analysis of settings, and a thorough understanding of the circuit design, which will involve covering areas such as metering, communication circuits and supervisory control and data acquisition (SCADA).

It also includes the procedures needed to enable proof of correct operation of all circuits to design specifications. It also encompasses the need for supplying accurate communication in the format that is acceptable to the operating or testing authority.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Protection Relays and Meters Pathway Unit Group

UETDRTS023 Repair, test and calibrate protection relays and meters

Metering Pathway Unit Group

UETDRTS005 Commission power systems metering schemes

UETDRTS010 Develop power systems secondary isolation instructional documents

UETDRTS014 Maintain and test and metering schemes

Primary Plant Pathway Unit Group

UETDRTS007 Conduct evaluation of power systems primary plant

UETDRTS010 Develop power systems secondary isolation instructional documents

Protection Systems Pathway Unit Group

UETDRTS010 Develop power systems secondary isolation instructional documents

UETDRTS015 Maintain complex network protection and control systems

UETDRTS017 Maintain interdependent network protection and control systems

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Plan for the design of testing and commissioning procedures for substation and field devices	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the undertaking of design of testing and commissioning procedures for substation and field devices, are reviewed and determined
	1.2	Purpose for designing of testing and commissioning procedures for substation and field devices is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures on policies and specifications for the design of testing and commissioning procedures for substation and field devices are obtained or established with appropriate personnel
	1.4	Testing procedures are discussed with appropriate personnel in order to ascertain the project brief
	1.5	Testing parameters are established from organisational established procedures on policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the design of	**2.1**	Circuit/systems modelling is used to evaluate alternative

testing and commissioning procedures for substation and field devices

proposals in accordance with established procedures

2.2 WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures

2.3 Design of testing and commissioning procedures for substation and field devices decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures

2.4 Mathematical and/or engineering models of design testing and commissioning procedures for substation and field devices are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures

2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

2.7 Testing and commissioning procedures for substation and field devices are developed according to requirements and established procedures

2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures

2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements

2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards

2.11 Strategic plans are developed incorporating organisation

		initiatives in accordance with established procedures
3 Complete the design of testing and commissioning procedures for substation and field devices	**3.1**	Final review of testing and commissioning procedures for substation and field devices is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design testing and commissioning procedures for substation and field devices documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS24 Design testing and commissioning procedures for field devices and substations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS009 Design testing and commissioning procedures for field devices and substations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- developing testing and commission procedures for at least three (3) of the following substation equipment:
  - bus protection
  - feeder/line protection
  - transformer protection
  - earth fault protection
  - backup protection
  - metering schemes
  - communication and supervisory control and data acquisition (SCADA) schemes
- developing testing and commissioning procedures for at least two (2) of the following field devices:
  - regulators
  - automatic circuit reclosers (ACR)/gas switch
  - line capacitors
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- powerline safety practices encompassing:
  - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker

- requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedures of climbing an overhead structure and fitting a pole chair
- traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, procedures used to provide an effective traffic management scheme and the use of a two-way radio
- control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; general fire prevention methods and the precautions for personal protection when fighting small fires
- rescue victims from heights and confined spaces - planning and identifying procedures; establishing responses; developing techniques; involvement of external emergency services; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
- requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, and requirements for effective communications operations for aerial work

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- electrical equipment associated with protection and control schemes encompassing:
  - types and applications of electrical equipment – characteristics, capabilities (schemes: overcurrent, frame leakage, cooling, buchholz, direct current (d.c.) supplies, restricted earth, sensitive earth fault, circuit breaker fail, reclose, d.c. frame leakage, CEL fail, under frequency load shed and earth fault)
- principles of isolation and tagging procedures associated with protection testing encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
  - requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
  - techniques in documenting isolations
  - techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise

standards
    - techniques in the installation and maintenance procedures for protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- maintenance and commissioning procedures associated with discrete protection schemes encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with maintenance and commissioning procedures
    - requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
    - techniques in maintenance and commissioning procedures – planning, policy and testing techniques
    - close out requirements
- relay manufacturer specifications encompassing:
    - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of relay manufacturer specifications
    - requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
    - types, function and characteristics of specific relays - differences between specific relays used for the same functionality
- procedure to undertake a visual inspection of a scheme encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
    - requirements for the use of manuals, system diagrams/plans and drawings
    - identifying obvious deficiencies in operating to the standard functionality
    - techniques in determining relay malfunction - targeting
    - techniques in determining wiring defects
- operation and maintenance procedures associated with discrete protection and control systems encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with operating procedures
    - requirements for the use of operating manuals, system diagrams/plans and drawings
    - techniques - gas collection and analysis, bleeding and resetting, calibration, operational and sensitivity checks, and trip and alarm checks
    - surge relay types and uses, including transformer main tanks and diverter switch chambers
- measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:
    - type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group and temperature

  - interpretation and analysis the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturer data and measurements
  - techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements
- substation safety practices encompassing:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures; plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
  - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP) and any WHS/OHS requirements associated with the use of EWP
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
  - control of oil spills - identification, use and maintenance of spill oil control equipment and materials; and oil containment facilities and systems
  - rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and/or rescue from confined spaces
  - enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors and emergency response procedures
  - hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors
- design principles of HV insulation systems encompassing:
  - insulation design principles - common materials used, electrical characteristics, thermal characteristics, uses and applications to substation HV plant and equipment, grading, construction and cooling
  - common contaminants and their effects - internal contaminants and external contaminants
  - testing and measurement of insulation quality - test types and common measuring instruments and techniques, resistance and resistivity, losses, measurement errors, temperature corrections and safe work practices related to testing and measurement
  - safety precautions when testing and measuring HV insulation systems - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)

- principles of power transformer construction and operations encompassing:
  - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, transmission and generation types
  - reactor types - shunt and series, applications and design considerations
  - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
  - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
  - insulation methods and techniques - fully insulated windings and graded insulation techniques, oil-filled and gas-filled power transformers
  - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, and impedance percent
  - nameplate details - BIL, tapping winding detail, physical layout, cooling ratings and physical details
  - transformer and reactor cooling types and their effects on design and rating
  - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
  - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
  - operating constraints as single units and in parallel
  - tapping windings - placement issues, tapping range, on-load tap changer (OLTC) versus off load tap changer techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types) and control system characteristics
  - HV bushing selection – type, insulation system used, rating, BIL, selection criteria and testing considerations
- principles of power transformer construction and operations encompassing:
  - applications of static reactive plant in HV networks, including voltage control, volt-ampere reactive (VAR) control and transient response capacity
  - types of static reactive plant, including HV capacitors, HV reactors, static VAR compensators (SVC) and combinations of these
  - operating characteristics and operational constraints, including point on wave switching issues
  - ratings, cooling systems and control systems and ancillary equipment used
  - configurations and system layout, including single star, double star and bridge type
  - typical protection systems used, including neutral unbalance current and neutral unbalance voltage
  - techniques used when balancing elements within static reactive plant
  - safety precautions when testing and maintaining HV static reactive plant - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- principles of power transformer high speed OLTC encompassing:

- selector types and applications for HV power transformers
- diverter switch types and applications for HV power transformers, including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag and pennant cycle
- ratings and construction principles
- operating mechanism types, stored energy systems and associated control systems
- operating principles and operating sequences of selectors and diverters
- measurement requirements, including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
- online diagnostic tools and devices
- ancillary equipment, including online filters, over pressure relays and devices
- testing requirements, including cycle timing, differential delay, energy accumulator mechanical and operational tests and control system functional tests
- safety precautions when testing and maintaining HV power transformer OLTC - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE

- operation and maintenance procedures associated with voltage regulation schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the operating procedures
  - requirements for the use of operating manuals, system diagrams/plans and drawings
  - principles of operation and operating sequences - voltage control, VAR control, live bus/dead bus synchronising checks, tap changer principles, requirements for parallel operations, settings and grading
  - techniques associated with - isolation requirements, enterprise maintenance requirements, setting checks, low voltage (LV) injections and electrical measurements
  - ancillary equipment, including transducers, buswire schemes, tap position indicators, local/remote control systems and alarm systems
  - voltage regulation scheme types, including electromechanical, micro-processor or combinations of both
- types and applications of test equipment encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
  - types and applications of test equipment used on discrete protection scheme
  - techniques in the use of test equipment - electronic test equipment (Doble and Ohmnicrome), gas injection equipment, manufacturer test equipment, multimeters, phase angle meters and meggers
- voltage control techniques encompassing:
  - conditions leading to voltage collapse
  - effects on system of HV and LV
  - voltage control devices - voltage regulators applied to generators and synchronous phase modifiers, electromagnetic voltage regulators; series and parallel capacitors; OLTC

transformers; and SVC, such as saturated reactor compensators, thyristor-controlled reactor compensators and combined systems
    - production of harmonics and methods of harmonic control
    - location of voltage control devices within the system
- transient over voltages encompassing:
    - causes and effects of transient over voltages - switching transients and lightning transients, and effects on plant items
    - control techniques and systems - surge diverters, shield wires and circuit breaker arc control
    - insulation systems - insulation systems, insulation coordination and insulation grading
- procedure to undertake a visual inspection of a scheme encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
    - requirements for the use of manuals, system diagrams/plans and drawings
    - identifying obvious deficiencies in operating to the standard functionality
    - techniques in determining device malfunction
    - techniques in determining wiring defects
- commissioning procedures associated with relevant equipment encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
    - requirements for the use of commissioning manuals, system diagrams/plans and drawings
    - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements
- detailed operation and setting of discrete protection systems encompassing:
    - earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination and backup protection
    - overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, current transformer summation, time graded discrimination and backup protection
    - alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, and over temperature schemes
- detailed operation of interdependent protection systems encompassing:
    - overcurrent and earth leakage schemes, including inter-tripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
    - pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme and pilot supervisory techniques
    - load shedding, voltage control, parallel operation and load rejection
    - busbar protection and circuit breaker failure protection
    - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking

- detailed operation of metering devices and principles encompassing:
  - common circuit configurations
  - meters and measurement principles
  - instrument transformer application
  - testing of metering systems and devices
  - implications of market operation
- detailed operation of fundamental test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence and the use of oscilloscopes
- detailed operation of protection test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of timing, voltage, current, resistance, inductance, capacitance, impedance, frequency, phase angle, phase difference and the use of primary, secondary and gas injection equipment
- detailed operation of metering test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurements of, voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices
- detailed operation of field device test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurements of voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices
- procedure for the systematic fault isolation through the application of diagnostic techniques encompassing:
  - principles of analytical questioning
  - techniques in drawing valid conclusions from first observations
  - concepts of broad first-line testing
  - consideration of/responsibility for avoidance of further damage
  - interpretation of specific test results - cause/effect

- techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution, diagnostic software, requirements for the use of manuals, system diagrams/plans, drawings, handbooks, specifications and fault pathways
- software/firmware functions awareness
- factors affecting field versus workshop repair costs
- scheduling minor/major repair activities and downtime
- implications of temporary repairs
- use of system knowledge and history
- data interpretation - expected versus actual
- feedback to design/production/installation processes
- subsystems and system structures
- system signals/status indicators
- known failure modes and trends
- action threshold warnings versus catastrophic failure
- component ratings/upgrades
- disassembly/reassembly techniques and care
- relative costs of repair and replacement - remaining life, ongoing maintenance, additional benefits of replacement equipment, e.g., improved productivity and quality.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS010 Develop power systems secondary isolation instructional documents

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the skills needed to develop secondary isolations. This will involve analysis of tripping and a thorough understanding of secondary voltage and current, direct current (d.c.), alarm, metering and communication circuits. It also involves accurate communication of this information in a format acceptable to the operating or testing authority.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the development of secondary isolation instructional documents	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the development of secondary isolation instructional documents, are reviewed and determined
	1.2 Purpose of the development of secondary isolation instructional documents is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the development of secondary isolation instructional documents are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to

		requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the development of secondary isolation instructional documents	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Development of secondary isolation instructional document decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the development of secondary isolation instructional documents are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance

		specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of the development of secondary isolation instructional documents is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the development of secondary isolation instructional documents	**3.1**	Final inspections of the development of secondary isolation instructional documents are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the development of secondary isolation instructional documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS29 Develop power systems secondary isolation instructional documents.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS010 Develop power systems secondary isolation instructional documents

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- developing secondary isolation instructional documents for at least four (4) of the following substation equipment:
  - bus protection
  - high impedance bus protection
  - feeder/line protection
  - transformer protection
  - earth fault protection
  - backup protection
  - pilot wire protection
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management

systems
    - analysis of relevant data and evaluation of WHS/OHS system effectiveness
    - assess resources to establish and maintain WHS/OHS management systems
- generation systems encompassing:
    - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
    - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
    - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
    - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
    - characteristics of a transmission, distribution and rail system - principal components, typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
    - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
    - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
    - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
    - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
    - auxiliary equipment used on transformers - function and basic operation of equipment
    - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
    - description, purpose and characteristics of a reactors
- HV generator control systems encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
    - safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
    - techniques in the installation of generator sets control systems - synchronising of generator control systems onto and off the network without interruption to supply, estimation of HV load and assessing the appropriateness of the generator
    - operating a generator in parallel to a single HV job - overhead systems, indoor systems,

customer installations and kiosk substations
    - HV generator set and control system to HV distribution assets
- electrical equipment fundamentals used in the powerline industry encompassing:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment (HV and low voltage (LV) equipment)
    - characteristics, capabilities and application of powerline electrical equipment
    - safety precautions with regards to using electrical equipment
    - techniques in pre-use inspection on the serviceability of electrical equipment
    - techniques in the general maintenance, care and storage of electrical equipment
    - identifying hazards, assessing and controlling risks associated with the use of electrical equipment
- coordinating access authority procedures encompassing:
    - specific enterprise processes, policies and procedures to be followed
    - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
    - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
    - techniques in the effective utilisation of available resources
    - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
    - techniques in facilitating and coordinating the delivery and issuing of access authorities
    - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements, such as WHS/OHS and electrical safety
    - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
    - methods of conducting audits on correct access authority procedures
    - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
    - issue and receipt of operating agreements
- HV system switching principles, including switching authorisation procedures, encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings
    - types and characteristics of HV systems and equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions,

and safe approach distances
    - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- LV system switching principles, including switching authorisation procedures, encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings
    - types and characteristics of LV systems and equipment to be switched
    - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, SAD, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permit authorities, requirements for team switching and procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- secondary switching/isolation principles and sheet preparation encompassing:
    - techniques in performing and demonstrating correct sequence of isolation and/or restoration - communications with appropriate authorities, ensuring adequate protection remains in service to provide plant protection, reading and interpreting drawings for switching/isolating, and sheet/instruction preparation
- protection schemes encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
    - types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
    - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
    - operation of overcurrent protection equipment used on distribution systems
    - operation of automatic circuit reclosers (ACR) and their time-current characteristics
    - types and characteristics of overcurrent relays
    - coordination methods of a distribution feeder protection scheme
    - earth fault protection used on a distribution feeder
    - operation of a single wire earth return (SWER) system
- extra-high voltage (EHV) generator control systems encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator

- safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
- techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
- operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
- EHV generator set and control system to EHV distribution assets.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS011 Install and maintain power system communication equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the installation and maintenance of network communication systems and includes the isolation and functional checks of discrete and interdependent communication schemes associated with power systems. It also encompasses power line carrier equipment, protection signalling equipment, radio systems and telephone systems, VF systems, multiplexing systems and fibre optic systems, but does not include wiring.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy

management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the installation and maintenance of power system communication equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the installation and maintenance of power system communication equipment systems, are reviewed and determined
	1.2 Purpose of the installation and maintenance of power system communication equipment is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the installation and maintenance of power system communication equipment are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the installation and maintenance of power system communication equipment	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Installation and maintenance of power system communication equipment decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the installation and maintenance of power system communication equipment are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to

		analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of the installed and/or maintained power system communication equipment is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the installation and maintenance of power system communication equipment	**3.1**	Final inspections of the installed and/or maintained power system communication equipment are undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the installation and maintenance of power system communication equipment documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS34 Install and maintain power system communication equipment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS011 Install and maintain power system communication equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing maintenance testing on substation communications equipment, including isolation and functional checks on at least three (3) of the following systems:
  - supervisory cables
  - power line carrier systems
  - protection signalling equipment
  - telephone systems
  - VF systems
  - fibre optics
- completing commissioning tests on substation communications equipment, including isolation and functional checks on at least three (3) of the following systems:
  - supervisory cables
  - power line carrier systems
  - protection signalling equipment
  - telephone systems
  - VF systems
  - fibre optics
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location,

and layout of thermal and hydroelectric power stations
    - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
    - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
    - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
    - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
    - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
    - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders; and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
    - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
    - characteristics of a power transformer - basic construction of distribution transformers; operation under load/no-load conditions; types and basic operation of tap changing switches, including solid state types, efficiency and cooling
    - auxiliary equipment used on transformers - function and basic operation of equipment
    - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
    - description, purpose and characteristics of a reactors
- coordinating access authority procedures encompassing:
    - specific enterprise processes, policies and procedures to be followed
    - processes of consultation, negotiation and c-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
    - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
    - techniques in the effective utilisation of available resources
    - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
    - techniques in facilitating and coordinating the delivery and issuing of access authorities
    - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management

procedures, and regulatory requirements, such as WHS/OHS and electrical safety
    - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
    - methods of conducting audits on correct access authority procedures
    - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
    - issue and receipt of operating agreements
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
    - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV system switching principles, including switching authorisation procedures, encompassing:
    - legislation, standards, codes, supply authority regulations and-or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings
    - types and characteristics of HV systems and equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances
    - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- low voltage (LV) system switching principles, including switching authorisation procedures, encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings
    - types and characteristics of LV systems and equipment to be switched
    - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, SAD, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures

- enterprise-specific equipment installation procedures encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of HV substation equipment to be installed
  - identification of components within the equipment to be installed and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for equipment to be installed
  - control equipment and auxiliary relays, flags and alarms
  - techniques in evaluating serviceability of equipment to be installed
  - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE); responsibilities and protocols; and safe working clearances
  - remote and local operating principles and conventions
- detailed operation of communication devices and principles encompassing:
  - types of communication systems
  - interface to power system equipment
  - hardware configurations
  - testing of communication links
- procedure for the systematic fault isolation through the application of diagnostic techniques encompassing:
  - principles of analytical questioning
  - techniques in drawing valid conclusions from first observations
  - concepts of broad first-line testing
  - consideration of/responsibility for avoidance of further damage
  - interpretation of specific test results - cause/effect
  - techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution, diagnostic software, requirements for the use of manuals, system diagrams/plans, drawings, handbooks, specifications and fault pathways
  - software/firmware functions awareness
  - factors affecting field versus workshop repair costs
  - scheduling minor/major repair activities and downtime
  - implications of temporary repairs
  - use of system knowledge and history
  - data interpretation - expected versus actual
  - feedback to design/production/installation processes
  - subsystems and system structures
  - system signals/status indicators
  - known failure modes and trends

  - action threshold warnings versus catastrophic failure
  - component ratings/upgrades
  - disassembly/reassembly techniques and care
  - relative costs of repair and replacement - remaining life, ongoing maintenance, additional benefits of replacement equipment, e.g., improved productivity and quality
- protection schemes encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
  - types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
  - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
  - operation of overcurrent protection equipment used on distribution systems
  - operation of automatic circuit reclosers (ACR) and their time-current characteristics
  - types and characteristics of overcurrent relays
  - coordination methods of a distribution feeder protection scheme
  - earth fault protection used on a distribution feeder
  - operation of a single wire earth return (SWER) system
- extra-high voltage (EHV) generator control systems encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
  - safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
  - techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
  - operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
  - EHV generator set and control system to EHV distribution assets.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS012 Install and replace complex energy/revenue metering schemes and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the installation and replacement of energy/revenue meters and associated equipment in complex situations. Replacement includes the identification of faults in accordance with established procedures and return to service. It includes the requirements to ascertain if normal functions of the meters and associated equipment are in accordance with operating standards.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTS013 Install and replace high voltage metering and associated equipment

UETDRTS016 Maintain compliance with national electricity market metrology practices and procedures

UETDRTS022 Perform current injection testing using phantom load

UETDRTS024 Test and maintain energy/revenue metering schemes

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the installation and replacement of energy/revenue metering schemes and associated equipment (complex)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the installation and replacement of energy/revenue metering schemes and associated equipment (complex), are reviewed and determined

	1.2	Purpose of the installation and replacement of energy/revenue metering schemes and associated equipment (complex) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures, policies and specifications for the installation and replacement of energy/revenue metering schemes and associated equipment (complex) are obtained or established with appropriate personnel
	1.4	Installation and replacement of energy/revenue metering schemes and associated equipment (complex) procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Installation and replacement parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients, customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal and external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the installation and replacement of energy/revenue metering schemes and associated	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent accidents and minimise waste are incorporated into the project in accordance with requirements and/or established

equipment (complex)		procedures
	2.2	Installation and replacement of energy/revenue metering schemes and associated equipment (complex) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Installation and replacement of energy/revenue metering schemes and associated equipment (complex) are undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the installation and replacement of energy/revenue metering schemes and associated equipment (complex)	**3.1**	Final inspections of the installation and replacement of energy/revenue metering schemes and associated equipment (complex) are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where

applicable, statutory or regulatory approval

3.4 Approved copies of the installation and replacement of energy/revenue metering schemes and associated equipment (complex) documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS41 Install and replace complex energy/revenue metering schemes and associated equipment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS012 Install and replace complex energy/revenue metering schemes and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing installation and replacement, on at least three (3) occasions, including at least three (3) of the following:
  - high voltage (HV) metering schemes
  - HV zone substation metering schemes
  - HV bulk supply point metering schemes
  - low voltage (LV)summation metering schemes
- performing, on at least three (3) occasions, the installation and replacement of the following:
  - HV current/voltage transformers (including return to service)
  - energy meters
  - associated equipment
- performing, on at least one (1) occasion, the following activity:
  - installation or replacement of a typical HV bulk supply point metering scheme
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- associated equipment encompassing:
  - summation current transformers, voltage selection relays, auxiliary supply relays, voltage fail relays, fibre optics, data concentrators and in-house displays
- the installation and replacement of complex energy/revenue metering schemes and associated equipment in accordance with enterprise policies and procedures applicable to the work -

impact of work on local network system integrity, substation entry and access requirements, and impacts of isolation on protection and control systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS013 Install and replace high voltage metering and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the installation and replacement of high voltage (HV) metering and associated equipment. Replacement includes the identification of faults in accordance with established procedures and return to service. It includes the requirements to ascertain if normal functions of the meters and associated equipment are in accordance with operating standards.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage

electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTS022 Perform current injection testing using phantom load

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the installation and replacement of HV metering and associated equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the installation and replacement of HV metering and associated equipment, are reviewed and determined
	1.2 Purpose of the installation and replacement of HV metering and associated equipment is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the installation and replacement of HV metering and associated equipment are obtained or established with appropriate personnel

	1.4	Installation and replacement of HV metering and associated equipment procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Installation and replacement parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients, customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal and external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the installation and replacement of HV metering and associated equipment	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	Installation and replacement of HV metering and associated equipment decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Installation and replacement of HV metering and associated equipment is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the installation and replacement of HV metering and associated equipment	**3.1**	Final inspections of the installation and replacement of HV metering and associated equipment are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the installation and replacement of high voltage metering and associated equipment documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS38 Install and replace high voltage metering and associated equipment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS013 Install and replace high voltage metering and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing installation and replacement, on at least three (3) occasions, of at least three (3) of the following:
  - high voltage (HV) metering schemes
  - HV zone substation metering schemes
  - HV bulk supply point metering schemes
  - HV summation metering schemes
- performing on at least three (3) occasions, the installation and replacement of the following:
  - HV current/voltage transformers (including return to service)
  - energy meters
  - associated equipment
- performing on at least one (1) occasion, the following activity:
  - installation or replacement of a typical HV bulk supply point metering scheme
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- associated equipment encompassing:
  - fuses, current transformers, voltage transformers, test block, current transformer chamber, marshalling kiosk, wiring, voltage fail relays, sealing equipment, terminals, links, modems, communications equipment, direct current (d.c.) supplies, aerials, optical isolation equipment, fibre optics, solid state recorders, pulse repeat relays, pulsing outputs, energy/distribution management systems, communication interface modules, and alarms

- selection of suitable equipment to meet site requirements and other requirements as prescribed by the regulated energy market rules
- communicating as required with market participants, including meter data provider and responsible person
- meter storage, handling and disposal processes in accordance with enterprise policies and procedures
- awareness of jurisdictional rules and requirements to allow work to be performed in local network service provider areas
- standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation and replacement of HV metering and associated equipment procedures
- use of enterprise and/or manufacturer manuals, system diagrams/plans and drawings and other related documentation for the installation and replacement of HV metering and associated equipment
- work in accordance with enterprise safe systems of work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS014 Maintain and test and metering schemes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the testing of metering schemes and includes isolation, inspection, monitoring, testing, adjustment; and repair, refurbishment and/or overhaul and functional checks on schemes, including ammeters, voltmeters, wattmeters, volt-ampere reactive (VAR) meters and energy metering. It also includes the understanding of the purpose of the testing so as to prove accuracy and suitability of the metering for the required task.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTS010 Develop power systems secondary isolation instructional documents

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the testing and maintenance of metering schemes	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing and maintenance of metering schemes, are reviewed and determined
	1.2 Purpose of the testing and maintenance of metering schemes is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the testing and maintenance of metering schemes are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the testing and maintenance of metering schemes	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Testing and maintenance of metering schemes decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the testing and maintenance of metering schemes are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

	2.7 Testing and maintenance of metering schemes is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the testing and maintenance of metering schemes	**3.1** Final inspections of the testing and maintenance of metering schemes are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of the testing and maintenance of metering schemes documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector

Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS25 Maintain and test and metering schemes.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS014 Maintain and test and metering schemes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating, on at least three (3) occasions, testing accuracy to established plans of at least three (3) schemes using the following equipment:
  - ammeter
  - voltmeter
  - wattmeter
  - volt-ampere reactive (VAR) meter
  - energy meter*
  - (*Must do)
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- procedure to undertake a visual inspection of a scheme encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
  - requirements for the use of manuals, system diagrams/plans and drawings
  - identifying obvious deficiencies in operating to the standard functionality

- techniques in determining device malfunction
- techniques in determining wiring defects

- procedures for the location and rectification of faults in electrical equipment up to 1000 volts alternating current (a.c.) and/or 1500 volts direct current (d.c.) encompassing:
  - relationship of WHS/OHS to the location and rectification of faults in electrical equipment - acts and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency first aid/resuscitation, rescue from a live electrical situation, and enterprise policies and procedures
  - types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, and fault-finding techniques and procedures
  - fundamental electrical concepts - effects of current, practical resistors, sources of electromagnetic field, series, parallel and series-parallel circuits, electrical measurement, capacitors, inductors and magnetism
  - fundamentals of general appliances - basic principles of appliances (non-mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances and fault-finding procedures (prescriptive)
  - fundamentals of single phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in phase splitting and universal type motors, and fault-finding procedures (prescriptive)
  - fundamentals of three phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedures and fault-finding procedures (prescriptive)
  - fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedures and fault-finding procedures (prescriptive)
- detailed operation of metering devices and principles encompassing:
  - common circuit configurations
  - meters and measurement principles
  - instrument transformer application
  - testing of metering systems and devices
  - implications of market operation
- detailed operation of metering test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurements of voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency,

harmonics and the use of transient and data logging devices

- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and/or 1500 volts d.c. encompassing:
  - safe electrical work practices and procedures according to standards such as AS/NZ 4836:2001 Safe working on low-voltage electrical installations and equipment, or equivalent
  - safe use of tools and plant
  - safe use of ladders and elevated work platforms (EWP)
  - safe use of personal protective equipment (PPE)
  - hazards in the (electrical) work environment - shock hazards, fire hazards, chemical hazards other hazardous areas
  - special situations
  - procedures for dealing with fires associated with electrical equipment
  - procedures for dealing with polychlorinated biphenyl (PCB)
  - electric shock victim rescue methods and procedures - basic first aid treatment for shock, burns and bleeding
  - purpose of each procedure and application - expired air resuscitation (EAR), external cardiac-compression (ECC), cardiopulmonary resuscitation (CPR) and combined application of EAR and ECC (purpose of each procedure and application)
  - components of a basic electrical circuit(s) – source, control, protection and load
  - types of circuit diagrams – symbols, conventions, interpretations and free sketches
  - types of circuit connections and functions - open circuit, closed circuit and short circuit
  - techniques in basic electrical measurement - use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; and using Ohms law
  - fundamental principles of electrical concepts - effects of current; practical resistors; sources of Electromagnetic Field (EMF); simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
  - techniques in insulation resistance measurement and requirements
  - earthing principles and systems
- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and/or 1500 volts d.c. encompassing:
  - methods for testing insulation resistance - continuity of prospective earthing conductor, and continuity between exposed conductive parts and the earthing system
  - methods of recognising acceptable test results for compliance with safety requirements
  - methods of recognising unacceptable test results requiring an appropriate qualified person to further investigate
  - cable types and conductor termination methods and techniques - conductors solid, stranded and flexible, and colour codes
  - single and three phase systems and loads - number of active and live conductors required, line and phase voltage and typical loads
  - identification and rating of general appliances

- single phase induction motors - motor identification, motor ratings and direction of rotation
- three phase induction motors - motor identification, motor ratings and direction of rotation
- single and three phase heaters - types of heaters, heater identification and heater ratings
- electrical distribution arrangement - power systems within premises, and purpose of switchboards/distribution boards (residual current devices and earth-leakage circuit breaker (ELCBs))
- circuit isolation and protection devices
- isolation procedures - work clearance, testing for voltage, lock-off and tagging, techniques in isolation and tagging, regulations, codes of practice and procedures
- disconnection procedures, practices and requirements
- types of replacement equipment
- methods of ensuring equipment is safe to connect to supply
- methods of reconnection procedures, practices and requirements
- methods of return equipment to service

- effects of harmonics encompassing:
  - characteristics and effects of harmonics on protection device functions/malfunction
  - effects of harmonics on transformers, generators, motors and quality of supply
- procedures for the systematic fault isolation through the application of diagnostic techniques encompassing:
  - principles of analytical questioning
  - techniques in drawing valid conclusions from first observations
  - concepts of broad first-line testing
  - consideration of/responsibility for, avoidance of further damage
  - interpretation of specific test results - cause/effect
  - techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution; diagnostic software; requirements for the use of manuals, system diagrams/plans, drawings and handbooks; and specifications and fault pathways
  - software/firmware functions awareness
  - factors affecting field versus workshop repair costs
  - scheduling minor/major repair activities and downtime
  - implications of temporary repairs
  - use of system knowledge and history
  - data interpretation, expected versus actual
  - feedback to design/production/installation processes
  - subsystems and system structures
  - system signals/status indicators
  - known failure modes and trends
  - action threshold warnings versus catastrophic failure
  - component ratings/upgrades

- disassembly/reassembly techniques and care
- relative costs of repair and replacement - remaining life, ongoing maintenance, and additional benefits of replacement equipment, e.g., improved productivity and quality.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS015 Maintain complex network protection and control systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the maintenance of network protection and control systems in complex situations and includes isolation, inspection, monitoring, testing, adjustment and repair, refurbishment and/or overhaul and functional checks. It includes schemes from discrete and interdependent schemes, such as distance, differential, transformer differential, bus zone, bus overcurrent, revenue metering, supervisory control and data acquisition (SCADA), communications, harmonic control and point on wave.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTS010 Develop power systems secondary isolation instructional documents

UETDRTS017 Maintain interdependent network protection and control systems

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the maintenance of network protection and control systems (complex)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the maintenance of network protection and control systems (complex), are reviewed and determined
	1.2 Purpose of the maintenance of network protection and control systems (complex) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the maintenance of network protection and control systems (complex) are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with and/or directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are ascertained from organisational established procedures, policies and specifications

	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the maintenance of network protection and control systems (complex)	**2.1** Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2 WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3 Maintenance of network protection and control systems (complex) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Mathematical and/or engineering models of the scheme are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance

		with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of network protection and control systems (complex) is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the maintenance of network protection and control systems (complex)	**3.1**	Final inspections of the network protection and control systems (complex) are undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the maintenance of network protection and control systems (complex) documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS35 Maintain complex network protection and control systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS015 Maintain complex network protection and control systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing all of the following
  - isolating protection, control and alarms associated with complex protection and control schemes
  - calibrating complex protection and control relays
  - carrying out function tests (trips and alarms) on complex protection and control schemes
  - writing reports on performance of complex protection and control schemes
  - isolating 'in service' current transformers
- completing all of the following:
  - activities that address the correction of errors in network protection and control systems
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- principles of power transformer construction and operations encompassing:
  - applications of static reactive plant in high voltage (HV) networks, including voltage control, volt-ampere reactive (VAR) control and transient response capacity
  - types of static reactive plant, including HV capacitors, HV reactors, static VAR compensators and combinations of these
  - operating characteristics and operational constraints, including point on wave switching issues
  - ratings, cooling systems and control systems and ancillary equipment used
  - configurations and system layout, including single star, double star and bridge type

  - typical protection systems used, including neutral unbalance current and neutral unbalance voltage
  - techniques used when balancing elements within static reactive plant
  - safety precautions when testing and maintaining HV static reactive plant - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
- detailed operation of complex protection systems encompassing:
  - distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes and bus zone
  - differential, transformer differential and bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, current transformer connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, special considerations and digital systems
  - types of revenue metering
  - applications of supervisory control and data acquisition (SCADA)
  - complex protection systems for communications
  - harmonic control
  - point on wave switching.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS016 Maintain compliance with national electricity market metrology practices and procedures

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers demonstrating an understanding of the regulated energy market national regulations to daily work practices of a customer's revenue metering installation.

It also includes demonstrating detailed knowledge of the individual's role and responsibilities as the onsite representative of the metering provider.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage

electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTS013 Install and replace high voltage metering and associated equipment

UETDRTS022 Perform current injection testing using phantom load

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the maintaining of compliance with national electricity market metrology practices and procedures	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the maintaining of compliance with national electricity market metrology practices and procedures, are reviewed and determined
	1.2 Purpose of the maintaining of compliance with national electricity market metrology practices and procedures is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel

	1.3	Organisational established procedures, policies and specifications for the maintaining compliance with national electricity market metrology practices and procedures are obtained or established with appropriate personnel
	1.4	Maintenance of compliance with national electricity market metrology practices and procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Maintenance of compliance with national electricity market metrology practices and procedures parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the maintaining of compliance with national electricity market metrology practices and procedures	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures

	2.3	Lifting, climbing, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Routine management of compliance issues with national electricity market metrology practices and procedures is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the maintaining of compliance with national electricity market metrology practices and procedures to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the maintaining of compliance with national electricity market metrology practices and procedures	**3.1**	Final compliance inspections with the maintenance of compliance with national electricity market metrology practices and procedures are undertaken to ensure they conform to all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are

finalised/commissioned according to established procedures and timeframes

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the maintaining of compliance with national electricity market metrology practices and procedures, documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS016 Maintain compliance with national electricity market metrology practices and procedures

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing, on at least three (3) occasions, the following activity:
  - maintaining the compliance of a customer's revenue metering installation with the metrology practices and procedures of the national electricity market
- demonstrating, on least one (1) occasion, the following activity:
  - the ability to locate, interpret and apply national electricity market rules
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- navigation of the internet to ascertain current technical and procedural standards applicable to meter provision within the regulated energy market
- interpreting and applying current technical and procedural standards applicable to meter provision within the regulated energy market
- maintaining customer and metering documentation in accordance with enterprise and regulatory requirements applicable to meter service provision in the regulated energy market
- processes and procedures applicable
- identifying and managing risks to compliance
- duties and obligations of market participants
- timeframes applicable to metering
- legal obligations of market and non-market participants
- other relevant legislations, WHS/OHS and trade practices act
- exemption procedures and data substitution procedures

- categories and types of metering installations
- accuracy class for types 1-7
- customer negotiations skills
- ISO 9001:2015 Quality Management System accreditation, ISO 14001:2015 Environmental Management Systems
- auditing course
- service level requirements
- meter asset management plan
- penalties for non-compliance
- interrogating and interpreting meter register, type of site, installation date, overall accuracy and ratios.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS017 Maintain interdependent network protection and control systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the maintenance of network protection and control in interdependent situations and includes isolation, inspection, monitoring, testing, adjustment, and repair, refurbishment and/or overhaul and functional checks of interdependent network protection and control systems. It includes the requirements to prove the functionality of interdependent and discrete schemes, such as circuit breaker fail, master-controlled earth fault, inter-tripping, blocking, synchronising, pilot wire, phase comparison, load shedding, voltage control, parallel operation and load rejection.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTS010 Develop power systems secondary isolation instructional documents

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the maintenance of network protection and control systems (interdependent)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the maintenance of network protection and control systems (interdependent), are reviewed and determined
	1.2 Purpose of the maintenance of network protection and control systems (interdependent) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the maintenance of network protection and control systems (interdependent) are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications

	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the maintenance of network protection and control systems (interdependent)	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Maintenance of network protection and control systems (interdependent) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the scheme are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance

		with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of network protection and control systems (interdependent) is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the maintenance of network protection and control systems (interdependent)	**3.1**	Final inspections of the network protection and control systems (interdependent) are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the maintenance of network protection and control systems (interdependent) documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS21 Maintain interdependent network protection and control systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS017 Maintain interdependent network protection and control systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirement, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating, at least five (5) times, each of the following activities:
  - isolating protection, control and alarms associated with interdependent protection and control schemes
  - carrying out function tests (trips and alarms) on interdependent protection and control schemes
  - writing reports on performance of interdependent protection and control schemes
  - isolating 'in service' current transformers
- dealing with unplanned events on at least one (1) occasion

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
  - particular reference to state and territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- electrical equipment associated with protection and control schemes encompassing:
  - types and applications of electrical equipment – characteristics, capabilities (schemes: overcurrent, frame leakage, cooling, buchholz, direct current (d.c.) supplies, restricted earth, sensitive earth fault, circuit breaker fail, reclose, d.c. frame leakage, CEL fail, under frequency load shed and earth fault)
- principles of isolation and tagging procedures associated with protection testing

encompassing:

- standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
- requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
- techniques in documenting isolations
- techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- techniques in the installation and maintenance procedures protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards

- maintenance and commissioning procedures associated with discrete protection schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the maintenance and commissioning procedures
  - requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
  - techniques in maintenance and commissioning procedures – planning, policy and testing techniques
  - close out requirements
- relay manufacturer specifications encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of relay manufacturer specifications
  - requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
  - types, function and characteristics of specific relays - differences between specific relays used for the same functionality
- safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the handling and disposing of insulation or heat dissipation materials used in power distribution devices
  - identification of environmental issues associated with the handling and disposing of insulation materials
  - safety precautions when handling and disposing of heat dissipation materials - safe working practices; WHS/OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures; types and function of specialised equipment; safe working practices when using specialised equipment; and emergency response and rescue, including first aid

    - techniques in the handling and disposing of insulation materials - polychlorinated bi-phenyls (PCB's), asbestos, insulating oil and sulfur hexafluoride (SF6) gas
- procedures to undertake a visual inspection of a scheme encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
    - requirements for the use of manuals, system diagrams/plans and drawings
    - identifying obvious deficiencies in operating to the standard functionality
    - techniques in determining relay malfunction - targeting
    - techniques in determining wiring defects
- operation and maintenance procedures associated with discrete protection and control systems encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with operating procedures
    - requirements for the use of operating manuals, system diagrams/plans and drawings
    - techniques - gas collection and analysis, bleeding and resetting, calibration, operational and sensitivity checks, and trip and alarm checks
    - surge relay types and uses, including transformer main tanks and diverter switch chambers
- measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:
    - type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group and temperature
    - interpretation and analysis the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturers data and measurements
    - techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements
- infra-red imaging principles encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to infra-red imaging
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types of enterprise-specific computer software
    - techniques in storing and retrieving data and reports from the computer
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for infra-red imaging reporting
    - techniques in evaluating serviceability of circuit breaker operation
    - procedures for obtaining correct HV switchyard arrangements - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols, and identifying switching resources
    - safety precautions when testing and measuring equipment with infra-red imaging - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and

protocols

- commissioning procedures associated with distribution protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy and testing techniques
  - close out requirements
- operation and maintenance procedures associated with voltage regulation schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the operating procedures
  - requirements for the use of operating manuals, system diagrams/plans and drawings
  - principles of operation and operating sequences - voltage control, volt-ampere reactive (VAR) control, live bus/dead bus synchronising checks, tap changer principles, requirements for parallel operations, settings and grading
  - techniques associated with isolation requirements, enterprise maintenance requirements, setting checks, low voltage (LV) injections and electrical measurements
  - ancillary equipment - transducers, buswire schemes, tap position indicators, local/remote control systems and alarm systems
  - voltage regulation scheme types - electromechanical, micro-processor or combinations of both
- types and applications of test equipment encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
  - types and applications of test equipment used on discrete protection scheme
  - techniques in the use of test equipment - electronic test equipment (Doble and Ohmnicrome), gas injection equipment, manufacturer test equipment, multimeters, phase angle meters and meggers
- electrical equipment associated with distribution field device protection and control schemes encompassing:
  - types and applications of electrical equipment – characteristics, capabilities (schemes: automatic circuit reclosers (ACR), gas switches, secondary injection tests, primary injection tests, trunked mobile radio (TMR), supervisory control and data acquisition (SCADA), remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, direct current (d.c) supplies, and alternating current (a.c.) supplies and alarms)
- circuit breaker auxiliary systems encompassing:
  - types and characteristics of high-pressure air systems, including air storage and air handling processes
  - types and characteristics of d.c. systems, including battery types, charging systems and protection systems

  - types and characteristics of special ambient gas (SF6) systems, including gas conditioning, storage and handling systems
  - types and characteristics of vacuum interrupters
  - types and characteristics of oil filled and oil handling
- detailed operation and setting of discrete protection systems encompassing:
  - earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination and backup protection
  - overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, current transformer summation, time graded discrimination and backup protection
  - alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, and over temperature schemes
- detailed operation of interdependent protection systems encompassing:
  - overcurrent and earth leakage schemes, including inter-tripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
  - pilot wire and phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme and pilot supervisory techniques
  - load shedding, voltage control, parallel operation and load rejection
  - busbar protection and circuit breaker failure protection
  - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking
- procedures for the location and rectification of faults in electrical equipment up to 1000 volts a.c. and or 1500 volts d.c. encompassing:
  - relationship of WHS/OHS to the location and rectification of faults in electrical equipment - acts and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency first aid/resuscitation, rescue from a live electrical situation, and enterprise policies and procedures
  - types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, fault-finding techniques and procedures
  - fundamental electrical concepts - effects of current; practical resistors; sources of electromagnetic field; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
  - fundamentals of general appliances - basic principles of appliances (non-mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances and fault-finding procedures (prescriptive)
  - fundamentals of single phase induction motors - basic principles of operation (non-mathematical); motor identification; motor ratings; basic principles of operation of control equipment and protection devices; fault conditions and symptoms; safe isolation procedures; test equipment; safe testing procedures, including continuity; fault types in phase splitting and universal type motors; and fault-finding procedures (prescriptive)

  - fundamentals of three phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedures and fault-finding procedures (prescriptive)
  - fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedures and fault-finding procedures (prescriptive)
- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and or 1500 volts d.c. encompassing:
  - safe electrical work practices and procedures according to standards such as AS/NZ 4836:2001 Safe working on or near low-voltage electrical installations and equipment, or equivalent
  - safe use of tools and plant
  - safe use of ladders and elevated work platforms (EWP)
  - safe use of PPE
  - hazards in the (electrical) work environment - shock hazards, fire hazards, chemical hazards and other hazardous areas
  - special situations
  - procedures for dealing with fires associated with electrical equipment
  - procedures for dealing with PCBs
  - electric shock victim rescue methods and procedures - basic first aid treatment for shock, burns and bleeding
  - purpose of each procedure and application - expired air resuscitation (EAR), external cardiac-compression (ECC), cardiopulmonary resuscitation (CPR), combined application of EAR and ECC
  - components of a basic electrical circuit(s) – source, control, protection and load
  - types of circuit diagrams – symbols, conventions, interpretations and free sketches
  - types of circuit connections and functions - open circuit, closed circuit and short circuit
  - techniques in basic electrical measurement - use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; and using Ohms law
  - fundamental principles of electrical concepts - effects of current; practical resistors; sources of electromagnetic field; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
  - techniques in insulation resistance measurement and requirements
  - earthing principles and systems
- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and or 1500 volts d.c. encompassing:
  - methods for testing insulation resistance - continuity of prospective earthing conductor, continuity between exposed conductive parts and the earthing system

- methods of recognising acceptable test results for compliance with safety requirements
- methods of recognising unacceptable test results requiring an appropriate qualified person for further investigation
- cable types and conductor termination methods and techniques - conductors solid, stranded and flexible, and colour codes
- single and three phase systems and loads - number of active and live conductors required, line and phase voltage, and typical loads
- identification and rating of general appliances
- single phase induction motors - motor identification, motor ratings and direction of rotation
- three phase induction motors - motor identification, motor ratings and direction of rotation
- single and three phase heaters - types of heaters, heater identification and heater ratings
- electrical distribution arrangement - power systems within premises, purpose of switchboards/distribution boards (residual current devices and circuit breakers)
- circuit isolation and protection devices
- isolation procedures - work clearance, testing for voltage, lock-off and tagging, techniques in isolation and tagging, regulation, codes of practice and procedures
- disconnection procedures, practices and requirements
- types of replacement equipment
- methods of ensuring equipment is safe to connect to supply
- methods of reconnection procedures, practices and requirements
- methods of return equipment to service

- effects of harmonics encompassing:
  - characteristics and effects of harmonics on protection device functions/malfunction
  - effects of harmonics on transformers, generators, motors and quality of supply.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals
- working at realistic heights above ground, i.e., above three metres, in limited spaces, with different structural/construction types and methods and in a variety of environments.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS018 Maintain, test and commission power systems voltage regulating equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the maintenance, testing and commissioning of distribution field devices to relevant standards, including voltage regulators, automatic circuit reclosers (ACR) control boxes, line capacitors and associated communication devices. It includes communicating with the operating authority, testing, clearing after test and energisation using techniques that are acceptable to the operating authority.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy

management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan and coordinate the maintenance, testing and commissioning of distribution field devices	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the maintenance testing and commissioning of distribution field devices, are reviewed and determined
	1.2 Purpose of the work is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established organisational procedures, policies and specifications for the work are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule

	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE required for the job are identified, scheduled and coordinated, and confirmed in safe and technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the maintenance, testing and commissioning of distribution field devices	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to avoid the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Maintenance, testing and commissioning decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the maintenance, testing and commissioning of distribution field devices	**3.1**	Final inspections of the work are undertaken to ensure it complies with all requirements and includes all specifications and documentation needed to complete the brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of test documents are issued and records updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS31 Maintain, test and commission power systems voltage regulating equipment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS018 Maintain, test and commission power systems voltage regulating equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- testing, on two (2) occasions, at least two (2) of the following:
  - automatic circuit recloser (ACR) control box and recloser functions
  - line capacitor controller
  - voltage regulating relay and voltage regulator
- commissioning, on two (2) occasions, at least two (2) of the following:
  - ACR control box and recloser
  - line capacitors
  - voltage regulating relay and voltage regulator
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management systems

- analysis of relevant data and evaluation of WHS/OHS system effectiveness
- assess resources to establish and maintain WHS/OHS management systems

- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components, typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation of equipment
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - description, purpose and characteristics of a reactors
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures

- techniques in facilitating and coordinating the delivery and issuing of access authorities
- techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements, such as WHS/OHS and electrical safety
- techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
- methods of conducting audits on correct access authority procedures
- process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
- issue and receipt of operating agreements

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
  - requirements for the use of manuals, system diagrams/plans and drawings
  - types and characteristics of HV systems and equipment to be switched
  - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances
  - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permit authorities, requirements for team switching and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- low voltage (LV) system switching principles, including switching authorisation procedures, encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
  - requirements for the use of manuals, system diagrams/plans and drawings
  - types and characteristics of LV systems and equipment to be switched
  - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and

procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- enterprise-specific equipment installation procedures encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE), responsibilities and protocols and safe working clearances
    - remote and local operating principles and conventions
- principles of power transformer construction and operations encompassing:
    - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, and transmission and generation types
    - reactor types - shunt and series, applications and design considerations
    - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
    - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
    - insulation methods and techniques - fully insulated windings and graded insulation techniques, oil-filled and gas-filled power transformers
    - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, and impedance percent
    - nameplate details - basic impulse level (BIL), tapping winding detail, physical layout, cooling ratings and physical details
    - transformer and reactor cooling types and their effects on design and rating
    - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
    - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
    - operating constraints as single units and in parallel
    - tapping windings - placement issues, tapping range, on-load tap changer (OLTC) versus off load tap changer techniques, types in use (high speed resistor, reactor and vacuum

types, Jansen mechanisms, dead tank and live tank types), and control system characteristics
    - HV bushing selection – type, insulation system used, rating, BIL, selection criteria and testing considerations
- principles of power transformer construction and operations encompassing:
    - applications of static reactive plant in HV networks, including voltage control, volt-ampere reactive (VAR) control and transient response capacity
    - types of static reactive plant, including HV capacitors, HV reactors, static VAR compensators (SVC) and combinations of these
    - operating characteristics and operational constraints, including point on wave switching issues
    - ratings, cooling systems and control systems and ancillary equipment used
    - configurations and system layout, including single star, double star and bridge type
    - typical protection systems used, including neutral unbalance current and neutral unbalance voltage
    - techniques used when balancing elements within static reactive plant
    - safety precautions when testing and maintaining HV static reactive plant - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- principles of power transformer high speed OLTC encompassing:
    - selector types and applications for HV power transformers
    - diverter switch types and applications for HV power transformers, including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag and pennant cycle
    - ratings and construction principles
    - operating mechanism types, stored energy systems and associated control systems
    - operating principles and operating sequences of selectors and diverters
    - measurement requirements, including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
    - online diagnostic tools and devices
    - ancillary equipment, including online filters, over pressure relays and devices
    - testing requirements, including cycle timing, differential delay, energy accumulator mechanical and operational tests, and control system functional tests
    - safety precautions when testing and maintaining HV power transformer OLTC - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- circuit breaker construction principles encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to circuit breakers
    - requirements for the use of manuals, circuit breaker diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation circuit breakers installed
    - use, characteristics and capabilities of specialised tools and equipment

- identification of components within the circuit breaker and associated control housings
- identification of energy sources within the circuit breaker and associated control housings
- identification of insulation paths within the circuit breaker
- types and characteristics of operating mechanisms
- types and characteristics of interrupter chambers
- safety precautions when constructing circuit breakers - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE

- synchronous condenser principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to synchronous condensers
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of synchronous condensers installed
  - identification of components within the synchronous condensers and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for synchronous condensers
  - techniques in evaluating serviceability of synchronous condensers operation
  - safety precautions when testing and measuring synchronous condensers - safe working practices and procedures; identification of hazards, assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; safe working clearances and communicating worksite procedures
- operation and maintenance procedures associated with voltage regulation schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the operating procedures
  - requirements for the use of operating manuals, system diagrams/plans and drawings
  - principles of operation and operating sequences - voltage control, VAR control, live bus/dead bus synchronising checks, tap changer principles, requirements for parallel operations, settings and grading
  - techniques associated isolation requirements, enterprise maintenance requirements, setting checks, LV injections and electrical measurements
  - ancillary equipment - transducers, buswire schemes, tap position indicators, local/remote control systems and alarm systems
  - voltage regulation scheme types - electromechanical, micro-processor or combinations of both
- electrical equipment associated with distribution field device protection and control schemes encompassing:
  - types and applications of electrical equipment – characteristics, capabilities (schemes: ACR, gas switches, secondary injection tests, primary injection tests, trunked mobile radio (TMR), supervisory control and data acquisition (SCADA), remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, direct current (d.c.) supplies, alternating current (a.c.) supplies and

alarms)

- voltage control techniques encompassing:
  - conditions leading to voltage collapse
  - effects on system of HV and LV
  - voltage control devices - voltage regulators applied to generators and synchronous phase modifiers; electromagnetic voltage regulators; series and parallel capacitors; OLTC transformers; and SVC, such as saturated reactor compensators, thyristor-controlled reactor compensators and combined systems
  - production of harmonics and methods of harmonic control
  - location of voltage control devices within the system
- voltage control devices encompassing:
  - typical devices applications and capacities
  - estimation of rating of VAR regulating devices using graphical techniques
- transient over voltages encompassing:
  - causes and effects of transient over voltages - switching transients and lightning transients, and effects on plant items
  - control techniques and systems - surge diverters, shield wires and circuit breaker arc control
  - insulation systems - insulation systems, insulation coordination and insulation grading
- commissioning procedures associated with relevant equipment encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy, testing techniques, close out requirements
- procedures for the location and rectification of faults in electrical equipment up to 1000 volts a.c. and/or 1500 volts d.c. encompassing:
  - relationship of WHS/OHS to the location and rectification of faults in electrical equipment - acts and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency first aid/resuscitation, rescue from a live electrical situation, and enterprise policies and procedures
  - types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, fault-finding techniques and procedures
  - fundamental electrical concepts - effects of current; practical resistors; sources of electromagnetic field; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
  - fundamentals of general appliances - basic principles of appliances (non-mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances and fault-finding procedures (prescriptive)
  - fundamentals of single phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, basic principles of operation of

control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in phase splitting and universal type motors, and fault-finding procedures (prescriptive)

- fundamentals of three phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedures and fault-finding procedures (prescriptive)
- fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedures and fault-finding procedures (prescriptive)

- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and/or 1500 volts d.c. encompassing:
  - safe electrical work practices and procedures according to standards such as AS/NZ 4836:2001 Safe working on low-voltage electrical installations and equipment, or equivalent
  - safe use of tools and plant
  - safe use of ladders and elevated work platforms (EWP)
  - safe use of PPE
  - hazards in the (electrical) work environment - shock hazards, fire hazards, chemical hazards and other hazardous areas
  - special situations
  - procedures for dealing with fires associated with electrical equipment
  - procedures for dealing with PCBs
  - electric shock victim rescue methods and procedures - basic first aid treatment for shock, burns and bleeding
  - purpose of each procedure and application - expired air resuscitation (EAR), external cardiac-compression (ECC), cardiopulmonary resuscitation (CPR), combined application of EAR and ECC
  - components of a basic electrical circuit(s) – source, control and protection, load
  - types of circuit diagrams – symbols, conventions, interpretations and free sketches
  - types of circuit connections and functions - open circuit, closed circuit and short circuit
  - techniques in basic electrical measurement - use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance and using Ohms law
  - fundamental principles of electrical concepts - effects of current; practical resistors; sources of electromagnetic field; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
  - techniques in insulation resistance measurement and requirements
  - earthing principles and systems
- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000

volts a.c. and/or 1500 volts d.c. encompassing:

- methods for testing insulation resistance - continuity of prospective earthing conductor, continuity between exposed conductive parts and the earthing system
- methods of recognising acceptable test results for compliance with safety requirements
- methods of recognising unacceptable test results requiring an appropriate qualified person to further investigate
- cable types and conductor termination methods and techniques - conductors solid, stranded and flexible, and colour codes
- single and three phase systems and loads - number of active and live conductors required, line and phase voltage, and typical loads
- identification and rating of general appliances
- single phase induction motors - motor identification, motor ratings and direction of rotation
- three phase induction motors - motor identification, motor ratings and direction of rotation
- single and three phase heaters - types of heaters, heater identification and heater ratings
- electrical distribution arrangement - power systems within premises and purpose of switchboards/distribution boards (residual current devices and earth-leakage circuit breakers)
- circuit isolation and protection devices
- isolation procedures - work clearance, testing for voltage, lock-off and tagging, techniques in isolation and tagging, regulation, codes of practice and procedures
- disconnection procedures, practices and requirements
- types of replacement equipment
- methods of ensuring equipment is safe to connect to supply
- methods of reconnection procedures, practices and requirements
- methods of return equipment to service

- effects of harmonics encompassing:
  - characteristics and effects of harmonics on protection device functions/malfunction
  - effects of harmonics on transformers, generators, motors and quality of supply
- procedures for the systematic fault isolation through the application of diagnostic techniques encompassing:
  - principles of analytical questioning
  - techniques in drawing valid conclusions from first observations
  - concepts of broad first-line testing
  - consideration of/responsibility for avoidance of further damage
  - interpretation of specific test results -cause/effect
  - techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution, diagnostic software, requirements for the use of manuals, system diagrams/plans, drawings, handbooks, specifications and fault pathways
  - software/firmware functions awareness
  - factors affecting field versus workshop repair costs

- scheduling minor/major repair activities and downtime
- implications of temporary repairs
- use of system knowledge and history
- data interpretation - expected versus actual
- feedback to design/production/installation processes
- subsystems and system structures
- system signals/status indicators
- known failure modes and trends
- action threshold warnings versus catastrophic failure
- component ratings/upgrades
- disassembly/reassembly techniques and care
- relative costs of repair and replacement - remaining life, ongoing maintenance, additional benefits of replacement equipment, e.g., improved productivity and quality

- protection schemes encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
  - types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
  - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
  - operation of overcurrent protection equipment used on distribution systems
  - operation of ACR and their time-current characteristics
  - types and characteristics of overcurrent relays
  - coordination methods of a distribution feeder protection scheme
  - earth fault protection used on a distribution feeder
  - operation of a single wire earth return (SWER) system
- extra-high voltage (EHV) generator control systems encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
  - safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
  - techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
  - operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
  - EHV generator set and control system to EHV distribution assets.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS019 Manage compliance with national electricity market metrology practices and procedures

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the management of compliance with national electricity market metrology practice and procedures. It includes managing work functions to ensure the compliance of a customer's revenue metering installation. This includes demonstrating detailed knowledge of the role and responsibilities as the representative of the metering provider. It also includes the establishment/maintenance of relationships with other market participants, and management of compliance with organisational policies, procedures and the national electricity market.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTS002 Commission energy/revenue metering schemes

UETDRTS012 Install and replace complex energy/revenue metering schemes and associated equipment

UETDRTS013 Install and replace high voltage metering and associated equipment

UETDRTS016 Maintain compliance with national electricity market metrology practices and procedures

UETDRTS020 Management of energy registration data errors for revenue billing purposes

UETDRTS022 Perform current injection testing using phantom load

UETDRTS024 Test and maintain energy/revenue metering schemes

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Plan for the management of compliance with national electricity market metrology practices and procedures	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of compliance with national electricity market metrology practices and procedures, are reviewed and determined
	1.2	Purpose of the management of compliance with national electricity market metrology practices and procedures is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures, policies and specifications for the management of compliance with national electricity market metrology practices and procedures are obtained or established with appropriate personnel
	1.4	Management of compliance with national electricity market metrology practices and procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Management of compliance with national electricity market metrology practices and procedures parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to

		coordinate the performance of work according to requirements and/or established procedures
2 Carry out the management of compliance with national electricity market metrology practices and procedures	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Routine management of compliance issue with national electricity market metrology practices and procedures is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the management of compliance with national electricity market metrology practices and procedures to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements

	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the management of compliance with national electricity market metrology practices and procedures	**3.1**	Final compliance inspections with management of compliance with national electricity market metrology practices and procedures are undertaken to ensure they conform to all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of routine testing and acceptance testing procedures/activities/results, for the management of compliance with national electricity market metrology practices and procedures, documents are issued and records updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS45 Manage compliance with national electricity market metrology practices and procedures.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS019 Manage compliance with national electricity market metrology practices and procedures

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing, on at least one (1) occasion, at least one (1) of the following activities:
  - ensuring compliance to the meter assets management plan
  - conducting appropriate field audits on behalf of or with a representative of the regulated energy market
- performing, on at least one (1) occasion, the following activity:
  - coordinating job activities for multiple discipline work groups
- performing, on at least one (1) occasion, the following activity:
  - managing work functions to ensure the compliance of a customer's revenue metering installation
- performing, on at least two (2) occasions, the following activity:
  - establishing/maintaining relationships with other market participants
- performing, on at least three (3) occasions, the following activity:
  - managing compliance with organisational policies, procedures and the national electricity market requirements
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- standards, codes, rules and regulations applicable to operation within a regulated energy market
- roles and responsibilities of a market participant (meter data provider, meter provider or

responsible person) operating within a regulated energy market
- detailed knowledge and understanding of the composition of a meter asset management pan (MAMP)
- the provisions of the organisations meter asset management plan
- coordinating job activities for multiple discipline work groups
- auditing for compliance within the regulated energy market
- ISO accreditation applicable to operation within a regulated energy market
- compliance with the organisations service level requirements within the regulated energy market
- management of customer, client and regulator negotiations and correspondence within a regulated energy market
- maintaining meter data within a regulated energy market
- managing registration of customer metering installations within the regulated energy market.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS020 Management of energy registration data errors for revenue billing purposes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers management of energy registration data errors for revenue billing purposes. It covers the identification of energy registration error within a metering scheme, evaluating the impact on the energy registration and customer billing data, and making recommendation for billing corrections and market settlement data updates.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage

electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTS013 Install and replace high voltage metering and associated equipment

UETDRTS016 Maintain compliance with national electricity market metrology practices and procedures

UETDRTS022 Perform current injection testing using phantom load

UETDRTS024 Test and maintain energy/revenue metering schemes

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the management of energy registration data errors for revenue billing purposes	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of energy registration data errors for revenue billing purposes, are reviewed and determined
	1.2 Purpose of the management of energy registration data errors for revenue billing purposes is established after

		data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures, policies and specifications for the management of energy registration data errors for revenue billing purposes are obtained or established with appropriate personnel
	1.4	Management of energy registration data errors for revenue billing purposes are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Management of energy registration data errors for revenue billing purposes are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the management of energy registration data errors for revenue billing purposes	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established

		procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Evaluation of revenue metering data and faults is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the management of energy registration data errors for revenue billing purposes to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the evaluation of revenue metering data and faults	**3.1**	Final inspections of the management of energy registration data errors for revenue billing purposes using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established

procedures and timeframes

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the management of energy registration data errors for revenue billing purposes, documents are issued and records updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS42 Management of energy registration data errors for revenue billing purposes.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS020 Management of energy registration data errors for revenue billing purposes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing, on at least three (3) occasions, the evaluation of two (2) revenue metering data by:
  - downloading load profile data
  - downloading event logs
  - determining error date and time (including calculating substitution data)
- demonstrating, on at least three (3) occasions, the use of at least two (2) different proprietary types of software to interpret the following:
  - alarms
  - meter program/software settings
  - event records
  - power quality records
  - sequence of events records
- performing, on at least three (3) occasions, the following:
  - report writing on in-depth analysis
- performing, on at least three (3) occasions, the evaluation and/or investigation of the following:
  - energy consumption data
  - registration data
  - current transformer/voltage transformer ratio confirmations
  - on-site load comparisons
  - customer consumption history
- performing, on at least two (2) occasions, the following:
  - consultation with customers or their representatives to confirm site consumption patterns and loading

- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- the use of different types of meter manufacturer proprietary software
- common failure modes and the impact on revenue billing
- tariff structures and conditions
- customer segments and commercial and industrial load patterns
- sources of alternative interval data from non-revenue metering systems for use in substitution of revenue data
- metering data substitution estimation and validation procedures for metering types 1-7.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS021 Perform accuracy checks on power systems instrument transformers

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers undertaking accuracy checks on instrument transformers and includes proving their functionality. It also includes both current and voltage instrument transformers having various operating principles, which are designed for metering, protection, monitoring or control usage. It also encompasses tasks associated with the isolation from other secondary circuits, inspection, measurement of excitation curves, measurement of phase and ratio errors and comparison of results with previous historical results and/or published specifications.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for accuracy checks on instrument transformers	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the performance of accuracy checks on instrument transformers, are reviewed and determined
	1.2 Purpose of the performance of accuracy checks on instrument transformers is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the performance of accuracy checks on instrument transformers are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out accuracy checks on instrument transformers	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Performance of accuracy checks on instrument transformer decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the performance of accuracy checks on instrument transformers are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance

		specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Accuracy checks on instrument transformers are undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the performance of accuracy checks on instrument transformers	**3.1**	Final review of test results on instrument transformers is undertaken to ensure they comply with all requirements and includes all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the performance of accuracy checks on instrument transformers documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS27 Perform accuracy checks on power systems instrument transformers.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS021 Perform accuracy checks on power systems instrument transformers

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing five (5) accuracy checks on instrument transformers and incorporating all of the following:
  - isolation from other secondary circuits
  - inspection
  - measurement of excitation curves
- measuring phase and ratio errors on all of the following:
  - current transformers
  - voltage transformers
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management systems

  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assess resources to establish and maintain WHS/OHS management systems
- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation of equipment
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault-finding procedures
  - description, purpose and characteristics of a reactors
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities

- techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements such as WHS/OHS and electrical safety
- techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
- methods of conducting audits on correct access authority procedures
- process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
- issue and receipt of operating agreements

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV system switching principles, including switching authorisation procedures, encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
  - requirements for the use of manuals, system diagrams/plans and drawings
  - types and characteristics of HV systems and equipment to be switched
  - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances
  - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- low voltage (LV) system switching principles, including switching authorisation procedures, encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
  - requirements for the use of manuals, system diagrams/plans and drawings
  - types and characteristics of LV systems and equipment to be switched
  - procedures for obtaining correct LV switching authorization - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permit authorities, requirements for team switching and procedures for coordination of operations

  - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- detailed operation of instrument transformers encompassing:
  - voltage and current transformer principles and terminology
  - types and classes of current transformers
  - constructions of current transformers
  - characteristics of current transformers
  - testing of current transformers
  - types and categories of voltage transformers
  - constructions of voltage transformers
  - characteristics of voltage transformers
  - testing of voltage transformers
- protection schemes encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
  - types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
  - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
  - operation of over current protection equipment used on distribution systems
  - operation of automatic circuit reclosers (ACR) and their time-current characteristics
  - types and characteristics of overcurrent relays
  - coordination methods of a distribution feeder protection scheme
  - earth fault protection used on a distribution feeder
  - operation of a single wire earth return (SWER) system
- extra-high voltage (EHV) generator control systems encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
  - safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
  - techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
  - operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
  - EHV generator set and control system to EHV distribution assets.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS022 Perform current injection testing using phantom load

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the performance of current injecting testing using a phantom load. It includes the application of artificial load onto low voltage (LV) current transformers to determine correct meter function while ensuring testing is conducted in accordance with established procedures.

It also includes the validation of secondary wiring circuits to determine the correct operation of the metering scheme.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage

electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the performance of current injection testing using phantom load	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the performance of current injection testing using phantom load, are reviewed and determined
	1.2 Purpose of the performance of current injection testing using phantom load is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the performance of current injection testing using phantom load are obtained or established with appropriate personnel
	1.4 Performance of current injection testing using phantom load procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief

	1.5	Current injecting testing parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the performance of current injection testing using phantom load	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	Decisions with regard to performance of current injection testing using phantom load are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	Mathematical/engineering models for the application of current injection testing using phantom load are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.4	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance

		with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.6	Application of current injection testing using phantom load is undertaken according to requirements and established procedures
	2.7	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the performance of current injection testing using phantom load	**3.1**	Final inspections of the LV current transformers are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the application of current injection testing using phantom load documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS37 Perform current injection testing using phantom load.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS022 Perform current injection testing using phantom load

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing, on at least three (3) occasions, the following:
  - application of artificial load onto low voltage (LV) current transformers for injection of current to determine correct meter function testing
- performing, on at least three (3) occasions, the following:
  - validation of secondary wiring circuits to determine the correct operation of the metering scheme
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- the application of current to an existing customer load through the primary of the current transformer
- the principles of current transformer operation
- determine the loading of the current transformer to apply the appropriate level of current required to verify the current transformer ratio, polarity and secondary wiring
- impacts of testing on market settlement/financial data and managing the data substitution requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS023 Repair, test and calibrate protection relays and meters

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the repair, calibration and testing of various types of protection relays. These can include electromechanical, analogue, digital electronic and numerical devices. It also involves finding and replacing faulty components, testing to manufacturer or user specifications and proving all functions of the devices under test.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the testing, repair and calibration of protection relays and meters	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing, repair and calibration of protection relays and meters, are reviewed and determined
	1.2 Purpose of the testing, repair and calibration of protection relays and meters is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the testing, repair and calibration of protection relays and meters are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to

		requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the testing, repair and calibration of protection relays and meters	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Testing, repair and calibration decisions of protection relays and meters are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the testing, repair and calibration of protection relays and meters are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance

	specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7 Testing, repair and calibration of protection relays and meters is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the testing, repair and calibration of protection relays and meters	**3.1** Final review of test results of tested, repaired and calibrated protection relays and meters is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of the testing, repair and calibration of protection relays and meters documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS28 Repair, test and calibrate protection relays and meters.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS023 Repair, test and calibrate protection relays and meters

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- using all of the following simple protection schemes:
  - auxiliary
  - overcurrent
  - timers
  - voltage
- using at least three (3) of the following intermediate protection devices:
  - inverse time delay overcurrent
  - voltage regulating relays
  - differential
  - pilot wire
- using at least two (2) of the following advanced protection schemes:
  - multi-zone impedance
  - multi-function feeder protection
  - phase comparison
  - digital current differential
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- procedures for the location and rectification of faults in electrical equipment up to 1000 volts alternating current (a.c.) and/or 1500 volts direct current (d.c.) encompassing:
  - relationship of WHS/OHS to the location and rectification of faults in electrical

equipment - acts and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency first aid/resuscitation, rescue from a live electrical situation, and enterprise policies and procedures

- types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, fault-finding techniques and procedures
- fundamental electrical concepts - effects of current, practical resistors, sources of electromagnetic field, series, parallel and series-parallel circuits, electrical measurement, capacitors, inductors and magnetism
- fundamentals of general appliances - basic principles of appliances (non-mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances and fault-finding procedures (prescriptive)
- fundamentals of single phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in phase splitting and universal type motors and fault-finding procedures (prescriptive)
- fundamentals of three phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedures and fault-finding procedures (prescriptive)
- fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedures and fault-finding procedures (prescriptive)

- detailed operation of metering devices and principles encompassing:
  - common circuit configurations
  - meters and measurement principles
  - instrument transformer application
  - testing of metering systems and devices
  - implications of market operation
- detailed operation of fundamental test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence, and the use of oscilloscopes
- detailed operation of protection test equipment encompassing:
  - care and safe use
  - operating principles

  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of timing, voltage, current, resistance, inductance, capacitance, impedance, frequency, phase angle, phase difference, and the use of primary, secondary and gas injection equipment
- protection schemes encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
  - types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
  - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
  - operation of overcurrent protection equipment used on distribution systems
  - operation of automatic circuit reclosers (ACR) and their time-current characteristics
  - types and characteristics of overcurrent relays
  - coordination methods of a distribution feeder protection scheme
  - earth fault protection used on a distribution feeder
  - operation of a single wire earth return (SWER) system.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS024 Test and maintain energy/revenue metering schemes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the testing and maintenance of energy/revenue metering schemes. It includes testing, isolation, inspection, monitoring, adjustment, repair, refurbishment and/or overhaul and functional checks of energy/revenue metering schemes.

It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state/territory and national) standards, metrology procedures, compliance to tariff requirements, revenue billing, energy registration and the identification of faults with metering equipment in accordance with established procedures.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTS013 Install and replace high voltage metering and associated equipment

UETDRTS016 Maintain compliance with national electricity market metrology practices and procedures

UETDRTS022 Perform current injection testing using phantom load

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the testing and maintenance of energy/revenue metering schemes	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing and maintenance of energy/revenue metering schemes, are reviewed and determined

	1.2	Purpose of testing and maintenance of energy/revenue metering schemes is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures, policies and specifications for the testing and maintenance of energy/revenue metering schemes are obtained or established with appropriate personnel
	1.4	Testing and maintenance of energy/revenue metering schemes procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Testing and maintenance parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the testing and maintenance of energy/revenue metering schemes	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures

	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Routine testing and acceptance testing of the installation, testing and maintenance of revenue metering schemes is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the safe testing and maintenance of energy/revenue metering schemes to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the testing and maintenance of energy/revenue metering schemes	**3.1**	Final inspections of the testing and maintenance of energy/revenue metering schemes using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project

3.2 Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the testing and maintenance of energy/revenue metering schemes, documents are issued and records updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS40 Test and maintain energy/revenue metering schemes.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS024 Test and maintain energy/revenue metering schemes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing, on at least three (3) occasions, testing/maintaining all of the following:
  - ensuring meter function
  - determining energy flows, voltage, current and phasor relationships
  - inspecting/monitoring equipment
  - gathering of information to ensure the application of standards and specifications have been met
  - specific notification of faults with metering equipment affecting energy registration and revenue billing in accordance with established procedures
  - ensuring that the installation is operating within prescribed limits (enterprise, manufacturer and regulated energy market requirements)
  - making recommendations, adjustments, replacements and repairs
- performing, on at least three (3) occasions, all of the following:
  - isolating, at local fuses and links
  - determining actions against standards if additional isolation is required
- demonstrating, on at least three (3) occasions, the functionality of the metering scheme in accordance with:
  - electrical installation (state and national) standards
  - metrology procedures
  - compliance to tariff requirements
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

the requirements of the elements and performance criteria and include knowledge of:

- operation of energy metering test equipment
- test equipment encompassing:
  - voltmeters, amp meters, Ohm meters, kWh/kVarh standards, tong ammeters, phase rotation meter, power factor meters, power quality meters, phantom load devices, current/voltage injection devices, measurement bridges, insulation resistance tester, phase angle meters, multimeters, standard current transformers/voltage transformers and insulated operating sticks
- other equipment encompassing:
  - personal computer, calculator, stop watches, printers, telecommunication devices and global positioning systems (GPS)
- testing principles and theories
- techniques in the testing and maintenance procedures of energy metering schemes in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- compliance with ISO 9001:2015 Quality Management Systems
- evaluation of test results to ensure compliance with ISO and Australian Standards
- notification of non-compliance to relevant parties.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- relevant plant, drawings, manufacturer specifications/manuals and specialised testing equipment
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS025 Test and maintain energy/revenue metering schemes (complex)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the testing and maintenance of energy/revenue metering schemes in complex situations. Complex metering schemes include summation, subtraction, generation, bulk supply, interconnector and wholesale metering installations. Testing and maintenance include isolation, accuracy testing, inspection, monitoring, adjustment, repair or overhaul and functional checks of complex energy/revenue metering schemes.

It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state/territory and national) standards, metrology procedures and compliance to tariff requirements.

This also includes the identification of faults with metering equipment, energy registration and revenue billing in accordance with established procedures.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEE137A Document and apply measures to control OHS risks associated with

electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTS002 Commission energy/revenue metering schemes

UETDRTS012 Install and replace complex energy/revenue metering schemes and associated equipment

UETDRTS013 Install and replace high voltage metering and associated equipment

UETDRTS016 Maintain compliance with national electricity market metrology practices and procedures

UETDRTS020 Management of energy registration data errors for revenue billing purposes

UETDRTS022 Perform current injection testing using phantom load

UETDRTS024 Test and maintain energy/revenue metering schemes

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the testing and maintenance of energy/revenue metering schemes (complex)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing and maintenance of energy/revenue metering schemes (complex), are reviewed and determined
	1.2 Purpose of testing and maintenance of energy/revenue metering schemes (complex) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the testing and maintenance of energy/revenue metering schemes (complex) are obtained or established with appropriate personnel
	1.4 Testing and maintenance of energy/revenue metering schemes (complex) procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing and maintenance parameters are established from organisational established procedures, policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies

	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the testing and maintenance of energy/revenue metering schemes (complex)	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Routine testing and acceptance testing of the testing and maintenance of energy/revenue metering schemes (complex) are carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards,

		safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the safe testing and maintenance of energy/revenue metering schemes (complex) to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the testing and maintenance of energy/revenue metering schemes (complex)	**3.1**	Final inspections of the testing and maintenance of energy/revenue metering schemes (complex) using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of routine testing and acceptance testing procedures/activities/results, for the testing and maintenance of energy/revenue metering schemes (complex), documents are issued and records updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS44 Test and maintain energy/revenue metering schemes (complex).

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS025 Test and maintain energy/revenue metering schemes (complex)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing, on at least three (3) occasion, the following activity:
  - field injection testing which includes determining site accuracy by applying multiple specific test points to determine and correct meter accuracy to applicable standards
- performing, on at least three (3) occasions, the testing and maintenance of any four (4) of the following:
  - summation
  - subtraction
  - generation
  - bulk supply
  - interconnector
  - wholesale metering installations
- performing, on at least three (3) occasions, the following activities:
  - identification of faults with metering equipment, energy registration and revenue billing
  - ensuring that all connection points are in operational order
  - identifying and correcting y functional errors
- dealing with unplanned events on at least (1) one occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- determining from schematics whether additional isolation is required and ensuring any current/voltage injection does not impact on related protection, control and supervisory control and data acquisition (SCADA) schemes

- calculation of site overall offset errors due to applied correction factors to the scheme
- calculation of site overall errors for logical metering schemes based on test results of individual related physical metering points
- identifying any impacts of testing on market settlement/financial data and managing the data substitution requirements
- determining the requirement for temporary metering during testing to ensure market settlement data is not adversely affected
- modifying and adapting test procedures to test non-standard metering schemes
- determining impacts of testing to ensure customer control, process and energy management systems are not adversely effected.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS026 Undertake power systems project management of substation augmentation and maintenance

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the coordination, planning and supervision of projects, including but not limited to, commissioning of new plant and equipment, maintenance projects and retrofit works. It includes coordinating and facilitating the work of others and the collation of the relevant outcomes and results and involves an overview of both primary and secondary works to ensure completion of all aspects of the project and must encompass at least 20 identifiable tasks.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Protection Relays and Meters Pathway Unit Group

UETDRTS023 Repair, test and calibrate protection relays and meters

Metering Pathway Unit Group

UETDRTS005 Commission power systems metering schemes

UETDRTS010 Develop power systems secondary isolation instructional documents

UETDRTS014 Maintain and test and metering schemes

Primary Plant Pathway Unit Group

UETDRTS007 Conduct evaluation of power systems primary plant

UETDRTS010 Develop power systems secondary isolation instructional documents

Protection Systems Pathway Unit Group

UETDRTS010 Develop power systems secondary isolation instructional documents

UETDRTS015 Maintain complex network protection and control systems

UETDRTS017 Maintain interdependent network protection and control systems

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the project management of substation augmentation and	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the undertaking of project management of substation

maintenance		augmentation and maintenance, are reviewed and determined
	1.2	Purpose of the undertaking of project management of substation augmentation and maintenance is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures on policies and specifications for the undertaking of project management of substation augmentation and maintenance are obtained or established with appropriate personnel
	1.4	Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Testing parameters are established from organisational established procedures and policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out project management of substation augmentation and maintenance	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures

	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Undertaking of project management of substation augmentation and maintenance decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the undertaking of project management of substation augmentation and maintenance are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of substation augmentation and maintenance is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the project management of substation	**3.1**	Final inspections of substation augmentation and maintenance are undertaken to ensure they comply with

augmentation and maintenance		all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the project management of substation augmentation and maintenance documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS33 Undertake power systems project management of substation augmentation and maintenance.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS026 Undertake power systems project management of substation augmentation and maintenance

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- managing three (3) projects (encompassing at least twenty (20) identifiable tasks), including installation, testing and commissioning stages
- applying project management skills, including all of the following:
  - work planning
  - coordination of labour resources
  - on-site supervision
  - controlling quality
  - use of quality systems
  - planned versus actual comparisons
  - communication with designers
  - control of materials
  - substation primary plant
  - substation secondary equipment
  - substations civil projects
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- system components and layouts encompassing:
  - distribution system layouts - overhead/underground, urban/rural, high voltage (HV) customers, high-rise building systems, three phase lines, single phase lines, single wire

earth return (SWER) systems, spur, parallel and ring systems, and typical substation types
    - transmission system layouts - lines, buses, transformers and cables; line/bus layouts, including single, double, ring and breaker and half systems; and HV crossing methods
- alternating current (a.c.) transmission system components encompassing:
    - support structures and reasons for selection
    - insulators and reasons for selection
    - conductors and reasons for selection
    - vibration management systems and principles
    - line ratings based on voltage, span, tension and temperature
- procedure to undertake a visual inspection of a scheme encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
    - requirements for the use of manuals, system diagrams/plans and drawings
    - identify obvious deficiencies in operating to the standard functionality
    - techniques in determining device malfunction
    - techniques in determining wiring defects
- commissioning procedures associated with relevant equipment encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
    - requirements for the use of commissioning manuals, system diagrams/plans and drawings
    - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRTS027 Verification and certification of revenue metering/energy measurement instruments

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the evaluation and development of procedures and routines to certify the accuracy, traceability and uncertainty of measurement of metering standards and test equipment. This encompasses developing test procedures, PC controlled and software driven test sequences and includes the evaluation of test equipment capability and design of hardware interfaces. These processes must ensure compliance with metering industry regulations to ensure traceability of all measurement.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEG171A Install, set up and commission interval metering

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRTS002 Commission energy/revenue metering schemes

UETDRTS012 Install and replace complex energy/revenue metering schemes and associated equipment

UETDRTS013 Install and replace high voltage metering and associated equipment

UETDRTS016 Maintain compliance with national electricity market metrology practices and procedures

UETDRTS020 Management of energy registration data errors for revenue billing purposes

UETDRTS022 Perform current injection testing using phantom load

UETDRTS024 Test and maintain energy/revenue metering schemes

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Plan for the verification and certification of revenue metering/energy measurement instruments	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence verification and certification of revenue metering/energy measurement instruments, are reviewed and determined
	1.2 Purpose of the verification and certification of revenue metering/energy measurement instruments is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the verification and certification of revenue metering/energy measurement instruments are obtained or established with appropriate personnel
	1.4 Verification and certification of revenue metering/energy measurement instruments procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Verification and certification parameters are established from organisational established procedures policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11 Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures

2 Carry out the verification and certification of revenue metering/energy measurement instruments	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Verification and certification of revenue metering/energy measurement instruments is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the safe verification and certification of revenue metering/energy measurement instruments to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards

3 Complete the verification and certification of revenue metering/energy measurement instruments	**3.1**	Final inspections of the verification and certification of revenue metering/energy measurement instruments using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of routine testing and acceptance testing procedures/activities/results, for the verification and certification of revenue metering/energy measurement instruments, documents are issued and records updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS46 Verification and certification of revenue metering/energy measurement instruments.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRTS027 Verification and certification of revenue metering/energy measurement instruments

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing, on at least three (3) occasions, the following activity:
  - developing and evaluating procedures and routines to verify and certify the accuracy, traceability and uncertainty of metering standards and test equipment
- performing, on at least one (1) occasion, the following activity:
  - evaluating and implementing procedures and practices to ensure traceability of test equipment to National Association of Testing Authorities (NATA) requirements
- performing, on at least one (1) occasion, the following activity:
  - developing test procedures for new hardware and analysing performance against required outcomes
- performing, on at least one (1) occasion, the following activity:
  - evaluating test equipment capability and design of hardware interfaces
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- enterprise-specific policies and procedure instructions encompassing:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation

procedures
    - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
    - overview of enterprise professional development - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- electrical field testing and measurement encompassing:
    - measurement concepts - notion of error, accuracy, resolution, sources of measurement error and uncertainties, instrument specifications and calibration certificates, test and measuring instrument safety certification levels and their application
    - types of field measuring instruments and their application - instrument meter movements and readouts (moving coil, moving iron and dynamometer meter movements, liquid crystal display (LCD) digital and screen readouts), and role of a microprocessor/controller in measuring instrument
    - measuring low voltages (LV) and direct current (d.c.) and alternating currents (a.c.) - LV and current measurement techniques embodied in microprocessor-based instruments, causes of inaccuracies and overcoming them, test instrument set-up and safety procedures, and interpreting test readings
    - measuring HV and d.c. and a.c. - HV and current measurement techniques embodied in microprocessor-based instruments, causes of inaccuracies and overcoming them, test instrument set-up and safety procedures, and interpreting test readings
    - measuring fault levels and (earth) fault loop impedance - fault and fault loop impedance measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set-up and safety procedures, and interpreting test readings
    - measuring power, energy, reactive power, power factor and maximum demand - power measurement techniques embodied in microprocessor-based instruments, causes of inaccuracies and overcoming them, test instrument set-up and safety procedures, and interpreting test readings
    - measuring power quality - power measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set-up and safety procedures, and interpreting test readings (power quality measurement, including waveform distortion, harmonics, power factor and transients)
- calibration techniques encompassing:
    - principles of common calibration techniques
    - purpose of standards and calibration certification
    - minimising error during calibration - source and type of errors, techniques to minimise errors during measurements, calculating the degree of error and calibration factors
    - determining the parameters to which the device will be calibrated
    - need for normal performance check
    - purpose of calibration documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC001 Apply work health and safety requirements for powerline vegetation control

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to apply work health and safety (WHS)/ occupational health and safety (OHS) requirements for powerline vegetation control in the electricity supply industry (ESI).

It includes identifying WHS/OHS legislation, regulations, standards, codes of practice and organisational workplace requirements and their application to relevant workplace tasks.

It also includes identifying hazards, controlling risks, responding to emergencies and completing relevant workplace documentation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Not applicable.

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Prepare to apply WHS/OHS requirements	**1.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the worksite are identified and referred to
	1.2	Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in safe working order
	1.3	Hazards are identified, risks assessed and control measures identified in accordance with workplace requirements
	1.4	Worksite is prepared to minimise risk in accordance with workplace requirements
2 Apply WHS/OHS requirements	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Lifting is carried out in accordance with workplace requirements
	2.3	Plant, tools, equipment and PPE are used in accordance with manufacturer and workplace requirements
	2.4	Hazard control measures are applied and monitored in accordance with workplace requirements
	2.5	Incidents and emergencies are responded to in accordance with workplace requirements
	2.6	Worksite is maintained in accordance with workplace requirements
	2.7	Hazards identified during the work are controlled in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.2	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.3	WHS/OHS recommendations are made in accordance with workplace requirements
	3.4	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit. No Equivalent Unit.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC001 Apply work health and safety requirements for powerline vegetation control

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - identifying typical hazards associated with powerline vegetation control work
  - applying and reviewing risk control measures to minimise, control or eliminate identified hazards
  - monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- applying workplace procedures for an emergency involving electricity
- using plant, tools and equipment safely
- applying correct manual handling techniques
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant WHS/OHS legislation, regulations standards, codes of practice and organisational workplace requirements, including:
  - duty of care
  - employer and employee responsibilities, rights and obligations
  - major functions of safety committees and representatives
  - powers of health and safety inspectors
  - WHS consultation (toolbox/safety meetings)
  - manual handling
  - working at heights
  - safe approach distances

    - drop zones
- hazard and risk assessment, including:
    - difference between hazards and risks
    - hierarchy of control
    - control measures and monitoring of control measures
    - hazards in the powerline vegetation control environment
    - physical and psychological hazards, including excessive noise, vibration, flying particles, heat, cold, ultraviolet (UV) radiation, chemicals, burns, dust, electrical currents, insects, snakes, fauna, fatigue, stress, drugs and alcohol
- types, inspection and application of PPE
- safe use of plant, tools and equipment, including:
    - pre-operational checks
    - post-operational checks
- types of fires and basic firefighting equipment
- types of injuries common in the powerline vegetation control environment
- incident, emergency and rescue procedures
- processes for communicating, reporting and recording incidents and emergencies
- hazardous substances and dangerous goods in the workplace, including:
    - classifications
    - labelling and storage requirements
    - purpose and interpretation of safety data sheets (SDS)
- working safely in a powerline vegetation control environment, including:
    - effects of electric shock on the body
    - consequences of short circuits, including arc flash and touch and step potentials
    - precautions to minimise the chance of electric shock
    - procedures for emergencies involving electricity
    - common causes of electrical accidents.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC002 Assess vegetation in an electricity supply industry environment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to assess vegetation in an electricity supply industry (ESI) environment.

It includes identification of vegetation, tree defects and hazards, encroaching vegetation, clearance zones, electrical network characteristics and environmental requirements.

It also includes recommending and documenting control measures.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRVC001 Apply work health and safety requirements for powerline vegetation control

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

outcomes.	demonstrate achievement of the element.
1 Prepare to assess vegetation	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work instruction is obtained and confirmed in accordance with workplace requirements
	1.3 Hazards are identified, risks assessed and control measures identified and applied
	1.4 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in safe working order
	1.5 Liaison and communication with stakeholders is carried out in accordance with workplace requirements
	1.6 Work is prioritised and sequenced for completion in accordance with workplace requirements
2 Conduct assessment of vegetation and recommend control measures	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Tools, equipment and PPE are used in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Vegetation is assessed in accordance with workplace requirements
	2.5 Environmental requirements are identified in accordance with workplace requirements
	2.6 Vegetation control measures are recommended in accordance with workplace requirements
3 Complete work and documentation	**3.1** Work instructions are updated, and documentation completed in accordance with workplace requirements
	3.2 Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.3 Personnel are notified of work completion in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC24 Assess vegetation and recommend control measures in an ESI environment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC002 Assess vegetation in an electricity supply industry environment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
- interpreting and using drawings, diagrams and instructions
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- identifying electrical apparatus, including but not limited to:
  - low voltage (LV)
  - high voltages (HV)
  - stay wires
- assessing vegetation clearances
- identifying tree species and characteristics, including regrowth
- assessing vegetation for defects and hazards, including
  - recommending control measures:
    - tools and equipment
    - safe approach distances for:
      - plant
      - persons and handheld tools
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:

  - WHS/OHS
  - vegetation clearances
  - safe approach distances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- events constituting an unplanned event or incident
- tree species and characteristics, including regrowth
- tree defects and hazards
- methods for removal, pruning and cutting of vegetation
- characteristics of overhead and underground electricity networks, including:
  - transmission, distribution and rail
  - layout/configuration
  - components
  - voltage levels
  - network diagrams.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, equipment specifications, regulations and codes of practice.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC003 Control vegetation for powerline work

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required for powerline vegetation control work in the electricity supply industry (ESI).

It includes vegetation control work in the vicinity of live electrical apparatus by line workers using plant, tools and equipment in accordance with workplace requirements.

This unit is subject to the following requirements for entry:

Note: Those holding an existing Certificate III ESI qualification or equivalent meets the prerequisite unit requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

AHCMOM213 Operate and maintain chainsaws

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to control vegetation	**1.1** Legislation, regulations, standards, codes of practice and industry workplace requirements for the work to be performed are obtained and confirmed
	1.2 Work plan is obtained and confirmed in accordance with workplace requirements
	1.3 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in safe working order
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
	1.6 Work permits are received and signed in accordance with workplace requirements
	1.7 Safety observer role and responsibilities are discussed and confirmed in accordance with workplace requirements
	1.8 Communication method between the workers and safety observer is determined and confirmed in accordance with workplace requirements
	1.9 Safe approach distances and vegetation clearances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.10 Worksite is prepared in accordance with the work plan and workplace requirements
	1.11 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Control vegetation	**2.1** Legislation, regulations, standards, codes of practice and industry workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of plant, tools

		and equipment are carried out in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Vegetation control is performed in accordance with work plan and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
	2.9	Quality checks of work are undertaken in accordance with work plan and workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work plan and workplace requirements
	3.2	Work permits are signed off in accordance with workplace requirements
	3.3	Incidents or unplanned events are reported in accordance with workplace requirements
	3.4	Worksite is rehabilitated, cleaned and made safe in accordance with workplace requirements
	3.5	Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.6	Work records, reports and documentation are completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC29 Control vegetation whilst performing linework.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC003 Control vegetation for powerline work

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
  - vegetation clearances
- identifying hazards and assessing risks
- identifying, applying and monitoring control measures
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- confirming safety observer is in position in accordance with workplace requirements
- communicating with the safety observer during the vegetation control work, including:
  - verbal
  - non-verbal
- pruning vegetation in accordance with workplace requirements, including:
  - using techniques for shaping, forming and controlling/managing epicormic regrowth
  - using appropriate cutting techniques for branch removal
  - providing clearance for electrical apparatus
  - applying the principles of compartmentalization of decay in trees (CODIT)
  - determining the correct location for the final cut
  - using species-appropriate pruning techniques
- using specialised tools and equipment safely
- performing pre-operational checks on specialised tools and equipment
- undertaking vegetation control measures using the following:
  - hand clearing
  - specialised tools and equipment
- dealing with an unplanned event on at least one (1) occasion

- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - vegetation clearances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods
- vegetation control principles and techniques
- pruning principles and techniques, including:
  - shaping, forming and controlling epicormic regrowth
  - preventing disease and damage (CODIT)
  - promoting tree health
  - providing clearance for electrical apparatus
  - effects of incorrect pruning
- tree physiology (basic), including:
  - photosynthesis
  - transpiration
  - respiration
  - plant development and growth
- biosecurity practices for pruning, including:
  - sterilisation of clothing, tools and equipment
  - management of debris removal
- specialised pruning tools and equipment, including:
  - inspection
  - care and maintenance
  - storage and transport
- pruning techniques, including:

- feathering
- formative
- preventative
- natural target pruning
- sequence (cutting techniques) for branch removal.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for controlling vegetation for powerline work
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC004 Control vegetation in the vicinity of live electrical apparatus from an elevated work platform

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to control vegetation in the vicinity of live electrical apparatus from an elevated work platform (EWP) in the electricity supply industry (ESI).

It includes the safe operation of an EWP, vegetation clearance zones, safe approach distances and specialised tools and equipment to cut and prune vegetation in accordance with workplace requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRVC001 Apply work health and safety requirements for powerline vegetation control

UETDRVC007 Control vegetation using pruning techniques

UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to control vegetation from an EWP	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work instruction is obtained and confirmed in accordance with workplace requirements
	1.3 Work permits are organised in accordance with workplace requirements
	1.4 Hazards are identified, risks assessed and control measures identified and applied
	1.5 EWP, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in safe working order
	1.6 Worksite is prepared in accordance with the work instruction and workplace requirements
	1.7 Routine pre-operational checks are completed to manufacturer specifications and workplace requirements
	1.8 Safety observer role, responsibility and communication method is discussed and confirmed in accordance with workplace requirements
	1.9 Safe approach distances and vegetation clearances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.10 Traffic management plan is confirmed as being in place in accordance with workplace requirements
2 Perform vegetation control from an EWP	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of EWP, tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance

		with workplace requirements
	2.4	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Vegetation control work from an EWP is performed in accordance with the work instruction and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work instruction and workplace requirements
	3.2	EWP, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.3	Incidents or unplanned events are reported in accordance with workplace requirements
	3.4	Work permits are signed off, where appropriate, in accordance with workplace requirements
	3.5	Worksite is cleaned and made safe in accordance with workplace requirements
	3.6	Work documentation is completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC25 Use elevated platform to cut vegetation above ground level near live electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC004 Control vegetation in the vicinity of live electrical apparatus from an elevated work platform

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS) requirements
  - safe approach distances
  - vegetation clearances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- organising and signing on and off relevant work permits in accordance with workplace requirements
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- performing pre-operational checks on elevated work platform (EWP), tools and equipment
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- using tools and equipment to safely control vegetation from an EWP, including:
  - techniques for shaping, forming, and controlling/managing epicormic regrowth
  - appropriate cutting technique for branch removal
  - providing clearance for electrical apparatus
- using an EWP whilst maintaining safe approach distance in the vicinity of live electrical apparatus
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace

requirements, including:

- WHS/OHS
- safe approach distances
- vegetation clearances

- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- application, purpose and types of work permits
- safety observer:
  - role and responsibilities
  - communication methods
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- vegetation control principles and techniques
- EWP operation, including:
  - types of, selection and safe use
  - insulation properties and testing
  - inspection, care and maintenance
  - emergency procedures
- vegetation control tools and equipment, including:
  - types of, selection and safe use
  - insulated tools and testing
  - inspection, care and maintenance.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC005 Control vegetation in the vicinity of live electrical apparatus from ground level

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to control vegetation in the vicinity of live electrical apparatus from ground level in the electricity supply industry (ESI).

It includes vegetation clearance zones, safe approach distances, the safe use of specialised tools and equipment to cut and prune vegetation in accordance with workplace requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRVC001 Apply work health and safety requirements for powerline vegetation control

UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

outcomes.	demonstrate achievement of the element.
1 Prepare to control vegetation from ground level	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work instruction is obtained and confirmed in accordance with workplace requirements
	1.3 Hazards are identified, risks assessed and control measures identified and applied
	1.4 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in safe working order
	1.5 Worksite is prepared in accordance with the work instruction and workplace requirements
	1.6 Routine pre-operational checks are completed to manufacturer specifications and workplace requirements
	1.7 Work permits are organised in accordance with workplace requirements
	1.8 Safety observer role, responsibility and communication method is discussed and confirmed in accordance with workplace requirements
	1.9 Safe approach distances and vegetation clearances for the work to be performed are determined and confirmed in accordance with workplace requirements
2 Perform vegetation control from ground level	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Hazard control measures are monitored in accordance with workplace requirements
	2.3 Tools, equipment and PPE are used in accordance with workplace requirements
	2.4 Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.5 Safe approach distances are maintained when the work is being performed

	2.6	Safety observer is positioned to observe the work in accordance with workplace requirements
	2.7	Vegetation control work is performed in accordance with the work instruction and workplace requirements
	2.8	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work instruction and workplace requirements
	3.2	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.3	Worksite is cleaned and made safe in accordance with workplace requirements
	3.4	Work permits are signed off, where appropriate, in accordance with workplace requirements
	3.5	Incidents or unplanned events are reported in accordance with workplace requirements
	3.6	Work documentation is completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC26 Cut vegetation at ground level near live electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC005 Control vegetation in the vicinity of live electrical apparatus from ground level

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
  - vegetation clearances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- organising and signing on and off relevant work permits in accordance with workplace requirements
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- performing pre-operational checks on tools and equipment
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- using tools and equipment to safely control vegetation
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - vegetation clearances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE

- application, purpose and types of work permits
- safety observer:
  - role and responsibilities
  - communication methods
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- vegetation control principles and techniques
- vegetation control tools and equipment, including:
  - types of, selection and safe use
  - insulated tools and testing
  - inspection, care and maintenance.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC006 Control vegetation in the vicinity of live electrical apparatus from within the tree

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to control vegetation in the vicinity of live electrical apparatus from within the tree in the electricity supply industry (ESI).

It includes cutting and pruning, vegetation clearance zones, safe approach distances, specialised climbing tools, equipment, personal protective equipment (PPE) and climbing techniques.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRVC001 Apply work health and safety requirements for powerline vegetation control

UETDRVC007 Control vegetation using pruning techniques

UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to control vegetation from within the tree	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work permits are organised in accordance with workplace requirements
	1.3 Work instruction is obtained and confirmed in accordance with workplace requirements
	1.4 Hazards are identified, risks assessed and control measures are identified and applied
	1.5 Tools, equipment and PPE required for work are determined, obtained and confirmed in safe working order
	1.6 Routine pre-operational checks are completed to manufacturer specifications and workplace requirements
	1.7 Worksite is prepared in accordance with the work instruction and workplace requirements
	1.8 Safety observer role, responsibility and communication method are discussed and confirmed in accordance with workplace requirements
	1.9 Safe approach distances and vegetation clearances for the work to be performed are determined and confirmed in accordance with workplace requirements
2 Perform vegetation control from within the tree	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 Lifting, working at heights and the use of tools, equipment and PPE are carried out in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Safety observer is positioned to observe the work in accordance with workplace requirements
	2.5 Communication methods between workers and safety observer are used in accordance with workplace

		requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Safe climbing techniques are applied in accordance with workplace requirements
	2.8	Vegetation control work is performed in accordance with the work instruction and workplace requirements
	2.9	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work instruction and workplace requirements
	3.2	Work permits are signed off, where appropriate, in accordance with workplace requirements
	3.3	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.4	Worksite is cleaned and made safe in accordance with workplace requirements
	3.5	Incidents or unplanned events are reported in accordance with workplace requirements
	3.6	Work documentation is completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC21 Use climbing techniques to cut vegetation above ground near live electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC006 Control vegetation in the vicinity of live electrical apparatus from within the tree

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
  - vegetation clearances
- identifying hazards and assessing risks
- identifying, applying and monitoring control measures
- organising and signing on and off relevant work permits in accordance with workplace requirements
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- performing pre-operational checks on tools and equipment
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- using safe climbing techniques
- using tools and equipment to safely control vegetation, including:
  - techniques for shaping, forming and controlling/managing epicormic regrowth
  - appropriate cutting technique for branch removal
  - providing clearance for electrical apparatus
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:

  - WHS/OHS
  - safe approach distances
  - vegetation clearances
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- application, purpose and types of work permits
- safety observer:
  - role and responsibilities
  - communication methods
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- climbing equipment, including:
  - types and application
  - inspection, care and maintenance
- safe climbing techniques
- vegetation control tools and equipment, including:
  - types of, selection and use
  - insulated tools and testing
  - inspection, care and maintenance.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC007 Control vegetation using pruning techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to control vegetation using pruning techniques in the electricity supply industry (ESI).

It includes pruning activities performed in accordance with relevant industry standards to achieve statutory vegetation clearance requirements.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRVC001 Apply work health and safety requirements for powerline vegetation control

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Prepare for pruning	**1.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2	Work instruction is obtained and confirmed in accordance with workplace requirements
	1.3	Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in safe working order
	1.4	Hazards are identified, risks assessed, and control measures identified and applied
	1.5	Work is prioritised and sequenced for completion in accordance with work instruction and workplace requirements
	1.6	Worksite is prepared in accordance with the work instruction and workplace requirements
2 Perform pruning	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	PPE is used in accordance with workplace requirements
	2.3	Hazard control measures are monitored in accordance with workplace requirements
	2.4	Pruning techniques are applied in accordance with work instructions and workplace requirements
	2.5	Pruning tools and equipment are operated safely and effectively in accordance with the manufacturer instructions and workplace requirements
	2.6	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work instruction and workplace requirements
	3.2	Tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
	3.3	Incidents or unplanned events are reported in accordance with workplace requirements

3.4 Worksite is cleaned and made safe in accordance with workplace requirements

3.5 Work documentation is completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC33 Apply pruning techniques to vegetation control near live electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC007 Control vegetation using pruning techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards and assessing risks
- identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- pruning vegetation in accordance with workplace requirements, including:
  - using techniques for shaping and forming vegetation
  - controlling/managing epicormic regrowth
  - using appropriate cutting techniques for branch removal
  - applying the principles of compartmentalization of decay in trees (CODIT)
  - determining the correct location for the final cut
  - using species appropriate pruning techniques
- using tools and equipment safely
- performing pre-operational checks on tools and equipment
- using correct cutting angle in accordance with workplace requirements, including:
  - branch bark ridge
  - stem bark ridge
  - visible branch collar
  - determining suitable growth points
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice industry and workplace requirements, including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of tools and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- pruning principles and techniques, including:
  - shaping, forming and controlling epicormic regrowth
  - preventing disease and damage (CODIT)
  - promoting tree health
  - effects of incorrect pruning
- tree physiology (basic), including:
  - photosynthesis
  - transpiration
  - respiration
  - plant development and growth (including epicormic growth)
- biosecurity practices for pruning, including:
  - sterilisation of clothing, tools and equipment
  - management of debris removal
- pruning tools and equipment, including:
  - inspection
  - care and maintenance
  - storage and transport
- pruning techniques, including:
  - formative
  - preventative
  - natural target pruning
  - sequence (cutting techniques) for branch removal
  - crown modification
  - directional pruning.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC008 Coordinate vegetation control operations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the coordination and implementation of continuous vegetation control and takes into account arboreal regeneration, environmental issues and liaison and consultation procedures with appropriate government agencies, property owners and environmental groups. It also encompasses conducting and/or contributing to public education processes and legislation issues.

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each state and territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone, including near live electrical apparatus, and regulations that directly relate to work health and safety (WHS)/occupational health and safety (OHS) and/or contracts of training where they apply.

Pre-requisite Unit

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare/plan to coordinate vegetation control work	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures are prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8 Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work

	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out the coordination of vegetation control work	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working aloft and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised persons for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Coordination of vegetation control work is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe coordination of vegetation control work to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements

	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the coordination of vegetation control work	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and equipment returned to service and client/customer advised in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC30 Coordinate vegetation control operations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC008 Coordinate vegetation control operations

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- using tools, equipment, materials and workplace procedures, including at least three (3) of the following clearing methods:
  - hand clearing
  - machinery assisted clearing
  - growth retardants
  - fire clearing
  - herbicidal clearing
- coordinating operations from two (2) of the following levels:
  - ladder
  - elevated work platform (EWP)
  - tree
  - ground
- considering all of the following:
  - personnel aspects
  - material aspects
  - financial aspects
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- principles of high voltage (HV) encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations

and/or enterprise requirements associated with working on or near HV

- electrical and electrostatic principles related to HV lines - relationship of current, voltage and resistance as related to transmission lines, relationship of phase voltage and respective line voltages
- production of an electric field – units, effect of distance, potential of an object within the field and the effect of distances to the potential
- HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, and performance of a failed disc insulator on the line and the system
- determining the minimum allowable number of discs per string for each line voltage in the system before bare hand work is to proceed
- techniques in detecting a failed disc in a string
- techniques in using appropriate tools and equipment to test a string
- methods of recording data
- effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field, and effects of electrostatic induction on bare hand work
- application of Faraday's cage - effects of a body, advantages, description of the Faraday's cage used by bare hand live line workers
- safety precautions working on or near HV electrical apparatus - safe approach distances from live line; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures
- types and function of specialised live working equipment
- safe working policies, procedures and practices when using and operating specialised equipment
- methods of using specialised equipment
- emergency response and rescue, including first aid
- effects of lighting and switching surges on performance of string insulators - health effects to workers
- methods used to alleviate surges on transmission lines
- magnetic field - difference between magnetic fields and electrostatic fields; source of magnetic field; techniques in locating, measuring and analysing known sources of magnetic fields; reasons for monitoring magnetic field exposure and techniques used to monitor magnetic fields

- ecological principles for vegetation control encompassing:
  - ecological principles - interdependence of plants, animals, the soil and the environment; environment; habitats and the food chain
  - soil and erosion control principles - soil types, simple tests, types of erosion, theory of erosion prevention and control, land degradation control and functions of trees in the environment
  - basic anatomy and physiology - plant morphology, internal anatomy, growth patterns and

habits, and simple physiology
    - tree hazard assessment encompassing: - symptoms of stress in trees, diagnosing tree problems, assessments for line clearance, personal hazards, the tree's response to wounding and decay, theory of compartmentalisation and tree stability (damage to root systems due to excavation)
    - principles of pruning
    - branch collars
- control of vegetation encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the control of vegetation - clearance zones and approach distances from overhead power lines, legislation associated with easement access and maintenance, appropriate PPE, equipment maintenance and safety precautions
    - tree climbing and pruning - chainsaw safety and maintenance, basic cross-cutting techniques, simple felling, use of EWPs, safe climbing with ropes and harnesses, use of chainsaws in the tree, cutting techniques, roping techniques, chemical control of foliage and the required safety techniques, and practical work on-site with a range of trees
    - easement management - legislation relating to easement access and maintenance, use of chemicals and herbicides and provision of material safety data sheets (MSDS) for those substances, use of machinery and plant, and access tracks
- working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker encompassing:
    - standards, guidelines/codes of practice, state/territory/local government legislation, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker
    - definitions of terminologies - 'safe working zone' 'risk assessment', 'safe approach distances zones', 'safe working distances'.' work permits',' access authorisation permits', 'technical standards' 'isolation procedures' and 'compliance requirements'
    - WHS/OHS policies and procedures for working safely - emergency response and first aid procedures, such as cardiopulmonary resuscitation (CPR); roles and responsibilities of employers, employees and other parties under WHS/OHS legislation; PPE; identifying hazards; assessing and controlling WHS/OHS risks; duties of a safety observer; working at heights/confined spaces; permit to work systems and isolation procedures; safe application of different types of tools and equipment; and operation of mobile plant and machinery (e.g. EWP) near live electrical apparatus
    - electricity supply infrastructure assets and voltages
    - techniques and precautions in undertaking different work functions and working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker - work functions that may be performed, including vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker
- coordination of vegetation control inspection programs encompassing:
    - Commonwealth/state/territory/local government legislation/regulations, standards, codes,

supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to coordinating the inspection of vegetation control: - clearance zones and approach distances from overhead power lines, legislation associated with easement access and maintenance, and use and operation of plant and equipment, such as EWPs, chainsaws/pole saws and stump grinders

- appropriate PPE
- equipment maintenance and safety precautions
- endangered plants/animals/insects
- soil erosion
- chemical treatment
- provision of manufacturer and supplier information, such as MSDSs
- traffic management control plan
- alternative engineering solutions for vegetation management
- emergency response and first aid procedures
- techniques in the inspection of vegetation to determine action required - diagnosing tree problems and systems of stress in trees; identification of fall zone; identification of WHS/OHS hazards; assessing and controlling risks; safety policies, procedures and precautions; responsibilities and protocols for team members; procedures for obtaining electrical access authorities and procedures for coordination of operations
- techniques in determining the resources required for a particular vegetation control project
- techniques in determining the condition of the tools and equipment needed for a particular vegetation control project
- techniques in determining the duration and cost of the vegetation control project
- techniques in relaying information to team members - safe precautions and procedures; clearances zones and approach distances; proper selection, maintenance, use and storage of PPE; procedures regarding safe use of equipment, including pre-operational checks for serviceability; and procedures in the safe transporting, use, storage and disposal of chemicals
- procedures for removal of vegetation
- techniques in record keeping of data.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to monitor vegetation control work in the vicinity of live electrical apparatus in an electricity supply industry (ESI) environment.

It includes communicating with workers to prevent unsafe work activities and to stop the encroachment of workers, mobile plant, tools and equipment into the safe approach distance.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRVC001 Apply work health and safety requirements for powerline vegetation control

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Prepare to monitor vegetation control work	**1.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2	Hazards are identified, risks assessed and control measures identified and applied
	1.3	Responsibilities of safety observer role are acknowledged and confirmed
	1.4	Communication method is discussed with the worker and confirmed in accordance with workplace requirements
	1.5	Safe approach distances and vegetation clearances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.6	Safety equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in safe working order
	1.7	Worksite is prepared in accordance with the work instructions and workplace requirements
2 Monitor vegetation control work	**2.1**	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2	Safety equipment and PPE is used in accordance with workplace requirements
	2.3	Safety observer is positioned to ensure an unobstructed view of the work
	2.4	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.5	Vegetation control work is monitored and controlled for safety compliance in accordance with workplace requirements
	2.6	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Incidents or unplanned events are reported in accordance with workplace requirements

3.2 Work documentation is completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- monitoring vegetation control work including safe approach distances and vegetation clearances
- identifying hazards and assessing risks
- identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- identifying electricity networks, including:
  - low voltage (LV)
  - high voltages (HV)
- maintaining drop zone
- selecting the best position for monitoring and controlling work
- identifying and using selected communication method
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - vegetation clearances
  - emergency response and rescue, including first aid

- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- safe use of plant, tools and equipment
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident
- safety observer:
  - role and responsibilities
  - communication methods
- vegetation cutting techniques
- operation of plant, tools and equipment.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, equipment specifications, regulations and codes of practice.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC010 Perform rescue from within a tree in the vicinity of live electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to perform rescue from within a tree in the vicinity of live electrical apparatus.

It includes applying safe approach distances, tree climbing techniques, rescue methods, inspection and use of rescue equipment.

It also includes emergency procedures for energised and non-energised rescue, hazard assessment, site security and reporting requirements.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRVC001 Apply work health and safety requirements for powerline vegetation control

UETDRVC006 Control vegetation in the vicinity of live electrical apparatus from within the tree

UETDRVC007 Control vegetation using pruning techniques

UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to respond to a rescue from within a tree	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the rescue response are referred to and confirmed
	1.2 Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to workplace requirements
	1.3 Emergency rescue responsibilities are confirmed and clarified with work team prior to work being undertaken
2 Respond and perform rescue from within a tree	**2.1** Emergency situation is assessed in accordance with workplace requirements
	2.2 Emergency responses are activated in accordance with workplace requirements
	2.3 Assistance is requested from work team and/or public, where required
	2.4 Nature of the injury is assessed and communicated
	2.5 First aid is applied, where required
	2.6 Casualty is prepared for descent according to first aid and risk assessments
	2.7 Casualty is lowered safely to the ground with support of rescuer
3 Perform casualty recovery	**3.1** First aid is applied on the ground, where required
	3.2 Emergency assistance is confirmed in accordance with emergency response
4 Complete documentation	**4.1** Incident is reported in accordance with workplace requirements
	4.2 Incident site is secured and entry controlled in accordance with workplace requirements
	4.3 Work documentation is completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC34 Undertake release and rescue from a tree near live electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC010 Perform rescue from within a tree in the vicinity of live electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
  - vegetation clearances
  - securing the incident site
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using rescue equipment
- performing a rescue from a tree using at least two (2) of the following rescue types:
  - lower casualty on own system
  - lower casualty on additional system
  - lower casualty on the rescuers climbing system
  - pole top (tree)
- using emergency communication system
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - WHS/OHS
  - safe approach distances
  - vegetation clearances
  - incident site security
  - reporting requirements

- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of personal protective equipment (PPE)
- branches/limbs that are unsafe to climb
- rescue equipment, including:
  - storage and maintenance
  - inspection
  - placement
  - components and application
- safe climbing practices, including:
  - ropes, slings and harnesses
  - roping and slinging techniques
  - application of lifelines and ropes
  - load bearing equipment and lifts
- range of emergency situations that may arise
- emergency response procedures in rescuing a climber, including:
  - first aid/cardiopulmonary resuscitation (CPR)
  - climber position with respect to live power lines
  - contacting emergency services
  - assessment of rescue priorities
  - safe rescue of the climber
  - selection of rescue method and equipment
- emergency response procedures in rescuing a person from an energised position, including:
  - climber position with respect to live power lines
  - identification of voltage
  - isolation of supply
  - contacting network operator/asset owners.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- suitable simulated work environment
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETDRVC011 Use specialised plant to cut vegetation above ground in the vicinity of live electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to use specialised plant to cut vegetation above ground in the vicinity of live electrical apparatus in the electricity supply industry (ESI).

It includes carrying out pre- and post-operational checks, vegetation clearances zones, safe approach distances, reporting faults and maintaining operational records and using the plant to safely cut vegetation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UETDREL002 Comply with environmental requirements

UETDREL006 Work safely in the vicinity of live electrical apparatus as a non-electrical worker

UETDRVC001 Apply work health and safety requirements for powerline vegetation control

UETDRVC009 Monitor vegetation control work in the vicinity of live electrical apparatus

Competency Field

Vegetation Control

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare specialised plant	**1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
	1.2 Work instruction is obtained and confirmed in accordance with workplace requirements
	1.3 Plant and personal protective equipment (PPE) required for the work are determined, obtained and confirmed in safe working order
	1.4 Hazards are identified, risks assessed, and control measures identified and applied
	1.5 Work is prioritised and sequenced for completion in accordance with work instruction and workplace requirements
	1.6 Work permits are organised in accordance with workplace requirements
	1.7 Worksite is prepared in accordance with the work instruction and workplace requirements
	1.8 Safety observer role, responsibility and communication method is discussed and confirmed in accordance with workplace requirements
	1.9 Safe approach distances and vegetation clearances for the work to be performed are determined and confirmed in accordance with workplace requirements
	1.10 Routine pre-operational checks are completed to manufacturer specifications and workplace requirements
2 Operate specialised plant	**2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
	2.2 PPE is used in accordance with workplace requirements
	2.3 Hazard control measures are monitored in accordance with workplace requirements
	2.4 Safety observer is positioned to observe the work in accordance with workplace requirements

	2.5	Communication methods between workers and safety observer are used in accordance with workplace requirements
	2.6	Safe approach distances are maintained when the work is being performed
	2.7	Plant is operated in a safe and controlled manner, and monitored for performance and efficiency
	2.8	Environmental implications associated with specialised plant operation are identified, assessed and reported according to workplace requirements
	2.9	Incidents or unplanned events are responded to in accordance with workplace requirements
3 Complete work and documentation	**3.1**	Completed work is checked for compliance against the work instruction and workplace requirements
	3.2	Work permits are signed off, where appropriate, in accordance with workplace requirements
	3.3	Shutdown procedures for specialised plant are completed to manufacturer specifications and workplace requirements
	3.4	Post-operational checks, minor maintenance of plant is conducted in accordance with workplace requirements
	3.5	Plant is cleaned and returned to storage in accordance with workplace requirements
	3.6	Incidents or unplanned events are reported in accordance with workplace requirements
	3.7	Worksite is cleaned and made safe in accordance with workplace requirements
	3.8	Work documentation is completed in accordance with workplace requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC32 Use specialised plant to cut vegetation above ground level in the vicinity of live electrical apparatus.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETDRVC011 Use specialised plant to cut vegetation above ground in the vicinity of live electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - safe approach distances
  - vegetation clearances
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining and signing on and off relevant work permits in accordance with workplace requirements
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- operating specialised plant to cut vegetation above ground level in the vicinity of live electrical apparatus
- conducting pre- and post-operational checks specialised plant
- inspecting and maintaining specialised plant
- determining communication method with safety observer
- confirming safety observer is in position in accordance with workplace requirements
- using operational techniques for the specific terrain, including on and off-road environments and weather conditions
- securing, cleaning and storing plant in accordance with manufacturer specifications and workplace requirements
- dealing with an unplanned event on at least one (1) occasion
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace

requirements, including:

- WHS/OHS
- safe approach distances
- vegetation clearances

- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- application, purpose and types of work permits
- safety observer:
  - role and responsibilities
  - communication methods
- specialised plant to cut vegetation above ground level in the vicinity of live electrical apparatus, including:
  - mechanical tree trimmer
  - mechanical hedger
  - pre- and post-operational checks
  - safe operation of plant
  - inspection, care, maintenance and transport/loading
  - emergency procedures
- relevant environmental implications associated with the operation of plant
- relevant work documentation
- vegetation control specialised plant, including:
  - work instruction relevant to the vegetation type
  - cutting techniques
  - drop zone
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDREL15 Respond to power systems technical enquiries and requests

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This Unit covers responding to enquiries of a technical nature using electricity supply industry (ESI) transmission, distribution and rail/tram network requirements, techniques and processes. It includes the relevant application of knowledge of relevant Acts and regulations, codes of practice, guidelines and compliance regimes, and arrangements used to facilitate a response to enquiries or requests. The enquiries may be internal or with customers.

Note: examples include storm codes identification of key equipment, recognition of normal and abnormal industry situations, key processes and systems used in the industry, such as maps and the application of general safety and environmental processes and practices used in the industry.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

There are no prerequisite competencies to this unit.

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to respond to technical enquiries and requests	**1.1** Instructions related to responding to enquiries using industry requirements, techniques and processes of a technical nature to be performed are received and confirmed
	1.2 Relevant requirements and established procedures to be followed and relevant personnel (including internal and/or customer) to be communicated with for the work to be performed are identified
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist in meeting the safety requirements for responding to technical enquiries and requests are made to others involved in the work
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear according to established procedures
	1.6 Scope of responsibility and process of relevant work permit(s) issue is identified, received and confirmed according to requirements and established procedures
	1.7 Relevant responsibility associated with first aid, safety observers and/or other related work safety procedures at the worksite are identified in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.8 Processes for identifying and reporting client (including internal and customer) issues to appropriate personnel in accordance with industry/acceptable/community standards are identified
	1.9 Workplace and the work schedule are confirmed according to given instructions for a quality outcome and to minimise risk and damage to property, commerce, stock and individuals in accordance with

		established procedures
	1.10	Electricity infrastructure assets, related voltages and requirements, where applicable, for working safely near live electrical apparatus as non-electrical worker are identified
	1.11	Safe approach distances, including any zones thereof that may apply as defined in industry guidelines, requirements and/or established procedures for the intended work, are confirmed
2 Carry out responses to technical enquiries and requests	**2.1**	WHS/OHS principles and practices to reduce the incidents of accidents are identified in accordance with given instructions, requirements and/or established procedures
	2.2	Enquiries and/or requests are responded to according to requirements and established procedures, and in a timely manner
	2.3	Working safely and complying with all safety requirements for responding to technical enquiries and requests are followed in accordance with given instructions and established routines/procedures
	2.4	Processes for monitoring and reporting/referring hazards and WHS/OHS risks to the immediate authorised personnel for directions according to established procedures are followed
	2.5	Non-routine events are referred to the immediate authorised personnel for directions according to established procedures
	2.6	Essential knowledge and associated skills are applied in the application of responding to technical enquiries and requests to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.7	Unexpected events associated with enquiries and/or requests of a technical nature are responded to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met
3 Complete responses to technical enquiries and	**3.1**	Work schedule and anomalies for completion and checking of the work are reported to authorised

requests		personnel in accordance with established procedures
	3.2	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures
	3.3	Requirements for returning work permit(s) and/or access authorisation permits, where applicable, are confirmed
	3.4	Appropriate personnel are notified of work completion according to established procedures
	3.5	Works completion records and/or report forms/data sheets are completed accurately in accordance with given instructions and established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL15A Respond to power systems technical enquiries and requests.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDREL15 Respond to power systems technical enquiries and requests

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- confirming safe working zone for safe work and access near live electrical and mechanical apparatus
- applying knowledge of relevant acts and regulations, codes of practice, guidelines and compliance regimes, and arrangements used
- identifying established (enterprise) procedures and processes
- confirming the principles of electricity, three phase power system, electric shock and resuscitation, and power system
- recognising aerial voltage systems
- identifying low voltage (LV) networks
- identifying high voltage (HV)networks
- identifying all of the following:
  - procedures in the event of an incident
  - events constituting an incident
  - procedures for responding to incidents
  - hazard and risk assessment general principles and procedures
  - principles for conducting worksite hazard assessment checks, basic safety principles and hazard control measures
- identifying all of the following:
  - purpose and use of work and/or authorisation permits
  - possible effects of weather conditions on working near electrical apparatus as a non-electrical worker
- applying knowledge of critical codes in the industry, e.g. storm code emergencies
- identifying key equipment used in the industry
- recognising normal and abnormal industry situations
- responding to a technical enquiry or request in accordance with established procedures and

timely manner
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- engineering applications of material properties encompassing:
  - identification and classification of engineering materials, including material properties
  - types and applications - properties of tensile strength; effects of temperature on the expansion of metals; ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion; and the properties of timbers
- generation power systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail power systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and how they correlate and their functions
  - characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- fundamentals for working safely near live electrical apparatus encompassing:
  - standards, guidelines/codes of practice, state/territory/local government legislation, supply authority regulations and/or enterprise requirements, including relevant certification and licensing, applicable to working safely up to the defined safe working zone near energised electrical apparatus (including. electrical powerlines) for non-electrical workers
  - definitions of terminologies - safe working zone risk assessment, safe approach distances zones, safe working distances, work permits, access authorisation permits, technical standards, isolation procedures and compliance requirements
  - WHS/OHS policies and procedures for working safely - emergency response and first aid procedures, such as cardiopulmonary resuscitation (CPR); roles and responsibilities of employers, employees and other parties under WHS/OHS legislation; personal protective equipment (PPE); identifying hazards; assessing and controlling WHS/OHS risks; duties

of a safety observer; working at heights/confined spaces; permit to work systems and isolation procedures; safe application of different types of tools and equipment
    - operation of mobile plant and machinery, such as an elevated work platform (EWP) near live electrical apparatus
    - electricity supply infrastructure assets and voltages
    - techniques and precautions in undertaking different work functions and working safely up to the defined safe working zone near energised electrical apparatus (including electrical powerlines) for non-electrical worker (work functions that may be performed include, vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker)
- enterprise-specific policies, procedures and instructions encompassing:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining up-to-date information on enterprise policies and procedures
    - rules and regulations
    - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
    - techniques when dealing with others - working in teams, customer relation, complaint and issues procedures
    - overview of enterprise professional development - fire-fighting procedures, fatigue management, training and competency development - understanding and promotion
- enterprises-specific WHS/OHS instructions encompassing:
    - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
    - methods of obtaining up-to-date information on enterprise WHS/OHS policies and procedures
    - specific enterprise PPE - type and application, where and when to be used, method of replacement, and responsibility for maintenance, including cleaning, inspection and testing
    - emergency response, rescue, evacuation and first aid procedures
    - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
    - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents encompassing:
    - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
    - instructions/worksheets - types and application of enterprise-specific symbols and

diagrams
    - title box - description of parts and version control
- basic network operating principles and parameters encompassing:
    - sources of electricity
    - basic principles of electricity, three phase power system, electric shock and resuscitation, and power system
    - aerial and underground voltage systems
    - LV network systems
    - HV network systems
    - equipment used in a network system
    - multiple earthed neutral (MEN) system
    - hazards and risks in a network system - risk to life, property or commerce, fallen wires/equipment and fires
    - voltage gradients - step potential and touch potential (transferred earth potentials)
- applicable legislation, regulations, standards, industry codes, industry guidelines and policies encompassing:
    - relevant sections of legislation used
    - relevant sections of international or Australian Standards used
    - relevant sections of industry codes used
    - relevant sections of industry guidelines used
    - relevant sections of policies used
    - relevant sections of advisory information used
- incident event procedures
- incidents constituting an event
- incidence response procedures
- general hazard and risk assessment principles and procedures
- principles for conducting worksite hazard assessment checks
- basic safety principles and hazard control measures
- key industry terms and performance indicators and measures used - System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), Momentary Average Interruption Frequency Index (MAIFI), Customer Average Interruption Duration Index (CAIDI), and network owners and operators
- critical industry codes used - storm code emergencies
- key equipment used in the industry - industry-specific equipment, switchgear, transformers, aerial conductors, insulators, poles, mobile plant and mobile equipment
- normal and abnormal industry situations, key processes and systems used in the industry - anomalies report, critical system/network failures/anomalies and key processes and systems used in the industry, e.g. maps, drawings, as well as safety and environment processes and practices; communications systems; fires; automatic switching; emergencies; and security breaches
- techniques and processes for responding to a technical enquiry or request in accordance with established procedures in a timely manner - ethical performance; assessing applications, enquiries or requests; using technology and media, including catalogues to assist

assessments; client quality service; and reflecting on the completed enquiry or request
- enquiries may be internal or with customers encompassing:
  - customer protocols
  - legal requirements and obligations for property access
- relevant heritage and environmental requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRIS65 Contribute to coordinated HV live working

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit specifies the outcomes required of live line working team members to work effectively as a cohesive team to ensure safety of all team members and the community when undertaking high voltage (HV) live line work. It includes the pre-work briefing on tasks to be undertaken, roles of individual team members, identification of possible hazards, risk management analysis and implementation of palliative measures to control or mitigate the risk to acceptable levels. It also encompasses the monitoring of work performance to ensure safety, and the post-work debriefing to identify areas for continuous improvement.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

There are no prerequisite competencies to this unit.

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Plan to contribute to a coordinated HV live line work team	**1.1**	Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination by the team
	1.2	Relevant requirements and established procedures for the work are communicated to all team members and identified for all worksites
	1.3	Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the working on HV live lines are obtained and confirmed for the purposes of the work to be performed and discussed among all team members
	1.4	Work is prioritised and sequenced following consultation with all team members to ensure safe systems of work are followed for completion within acceptable timeframes and in accordance with established procedures
	1.5	WHS/OHS and live line work hazards are identified, risk assessments conducted and control measures identified, prioritised, implemented and documented against the work schedule, including the checking of site weather and environmental conditions, to ensure that live line work can be undertaken safely
	1.6	Relevant live line work permits or authority for live line work are secured to coordinate the performance of work by the team according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry

		out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	All team members to be engaged in the work discuss and agree, without ambiguity, on their respective roles, and possible role changes during the course of work
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the contribution to coordinated HV live line work	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures, in particular, established live line working procedures are strictly adhered to
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices, where applicable, are safely exercised according to requirements
	2.4	Live line permits and other provisions for live line work are in place, as required, in accordance with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied in the safe contribution to coordinated HV live line work to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.6	Work is undertaken on HV live line in a team environment work according to the work schedule and requirements/established procedures
	2.7	Work is shared among all team members in a coordinated manner as discussed and agreed during pre-work briefing
	2.8	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks discussed with

		team members and reported to immediate authorised personnel for directions according to established procedures
	2.9	Unplanned events in the maintenance of HV live line work are discussed among all team members and appropriate actions undertaken accordingly
	2.10	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.11	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the contribution to coordinated HV live line work	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and HV live line work is returned to service and client/customer advised in accordance with requirements
	3.6	Works completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified
	3.7	Aspects of work schedule are discussed/identified via feedback with fellow team members and information on improvement forwarded to appropriate personnel according to established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS65A Contribute to coordinated HV live working.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRIS65 Contribute to coordinated HV live working

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- facilitating communication/consultation processes in a high voltage (HV) live line work team environment
- contributing to pre-work briefings and securing of live line permits or authority to work in a HV live line work team environment
- implementing WHS/OHS policies and procedures in a HV live line work team environment
- contributing to the work schedule in a HV live line work team environment
- contributing to feedback consultation on improving safe working in a HV live line work team environment
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical safe working practices encompassing:
  - risk management and assessment of risk - principle and purpose of risk management and processes for conducting a risk assessment
  - hazards associated with low voltage (LV), extra-low voltage (ELV) and high currents - arrangement of power distribution and circuits in an electrical installation, parts of an electrical system and equipment that operate at LV and ELV, and parts of an electrical system and equipment where high currents are likely
  - risks and control measures associated with HV - parts of an electrical system and equipment that operate at HV, the terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of HV, and control measures used for dealing with the hazards of HV
  - optical fibre safety - coherent optical sources and joining procedures, and laser safety

class 3a devices or their replacement

- risks and control measures associated with LV - risks associated with modifying electrical installations; fault finding, maintenance and repair; control measures before, during and after working on electrical installations, circuits or equipment; isolation and tagging-off procedures; risks and restrictions in live work, and control measures for live work
- risks and control measures associated with harmful dusts and airborne contaminants - thermal insulation, fibrous cement materials, and asbestos and other fibre reinforced switchboard materials
- safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, safe use of electrical testing device, and checks and storage methods for maintaining the safety of testing devices

- powerline safety practices encompassing:
  - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
  - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes; and the safety issues relating to clearances from overhead conductors
  - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedures of climbing an overhead structure and fitting a pole chair
  - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, the procedure used to provide an effective traffic management scheme and the use of a two-way radio
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; general fire prevention methods and the precautions for personal protection when fighting small fires
  - rescue victims from heights and confined spaces - planning and identifying procedures, establishing responses, developing techniques, involvement of external emergency services, and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
  - requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work
- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing

rules

- working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker encompassing:
  - standards, guidelines/codes of practice, state/territory/local government legislation, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to working safely up to the defined "safe working zone" near energised electrical apparatus, including electrical powerlines, for non-electrical worker
  - definitions of terminologies - ‘safe working zone’ ‘risk assessment’, ‘safe approach distances zones’, ‘safe working distances’.’ work permits’, access authorisation permits’, ‘technical standards’ ‘isolation procedures’ and 'compliance requirements’
  - WHS/OHS policies and procedures for working safely - emergency response and first aid procedures, such as CPR; roles and responsibilities of employers, employees and other parties under WHS/OHS legislation; personal protective equipment (PPE); identifying hazards; assessing and controlling WHS/OHS risks; first aid procedures; duties of a safety observer; working at heights/confined spaces; permit to work systems and isolation procedures
  - safe application of different types of tools and equipment
  - operation of mobile plant and machinery, such as elevated work platform (EWP) near live electrical apparatus
  - electricity supply infrastructure assets and voltages
  - techniques and precautions in undertaking different work functions and working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker - work functions, such as vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker
- enterprise-specific policies and procedure instructions encompassing:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing;

and emergency response, rescue, evacuation and first aid procedures
    - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
    - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific specialised tools encompassing:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools - voltage detectors, polarity testers and phase rotation
    - characteristics, capabilities and application of specialised tools for a particular job
    - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
    - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
    - techniques in pre-use inspection on the serviceability of specialised tools
    - techniques in the selection, use, maintenance, care and storage of specialised tools
    - identifying WHS/OHS hazards, assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific HV live line teamwork encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV live lines
    - safety precautions working on energised live lines when working in teams - live line minimum approach distances for person and plant; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE; live line access authority/permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices and checking integrity of insulation prior to work commencement
    - types and functions of specialised live line working equipment and tools and inspection techniques prior to use
    - safe working policies, procedures and practices when using and operating specialised equipment and tools
    - methods of using specialised equipment and tools
    - use of safety observers
    - emergency response and rescue, including first aid
    - relationship and responsibilities of each team member - roles of individuals in the team, contribution to joint outcome, goals/plans and objectives of the team
    - work team communication - techniques in effective communication, techniques in effective teamwork and dangers of ineffective teamwork.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRIS67 Solve problems in energy supply network equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to solve problems in energy supply network equipment in the electricity supply industry (ESI).

It includes determining correct operation of energy supply network electrical equipment and providing solutions. It also includes working safely, reading circuit and reticulation diagrams, applying problem solving processes from measurements and completing the necessary documentation.

The application of the skills and knowledge described in this unit may require a licence to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to solve problems in energy supply network equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 Extent of work to be undertaken is determined from reports and/or discussions with relevant person/s
	1.3 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.4 Materials required for work are determined in accordance with workplace procedures
	1.5 Tools, equipment and testing devices required to take measurements are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Solve problems in energy supply network equipment	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in accordance with WHS/OHS requirements and, when necessary, conducted in accordance with workplace safety procedures
	2.3 Circuits/machines/plant are isolated, where necessary, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Safety hazards resulting from reports and risk control measures devised and implemented in consultation with appropriate personnel
	2.5 Problem solving of energy network equipment is approached methodically using measured and calculated

		values of circuit/apparatus parameters
	2.6	Circuit/apparatus components are dismantled, where necessary, and parts stored to protect them against loss or damage
	2.7	Circuits/components are rechecked and their operational status is confirmed
	2.8	Materials/replacement parts required to solve problems are sourced and obtained in accordance with workplace procedures
	2.9	Effectiveness of the repair is tested in accordance with workplace procedures
	2.10	Apparatus is reassembled, tested and prepared for return to service
	2.11	Unplanned events are dealt with safely and with the approval of relevant personnel
	2.12	Problem-solving activities are completed without damage to apparatus, circuits, the surrounding environment or services applying sustainable energy practices
3 Complete and report on problem solving in energy supply network equipment	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares
	3.3	Maintenance work activities are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS67A Solve problems in energy supply network equipment.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRIS67 Solve problems in energy supply network equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- solving problems in energy supply network equipment, including:
  - determining the operating parameters of existing energy supply equipment
  - envisaging the likely extent of work from reports and discussions with appropriate personnel
  - using methodical problem-solving techniques
  - solving problems efficiently
  - altering an existing energy supply equipment to comply with specified operating parameters
  - developing energy supply equipment to comply with a specified function and operating parameters
  - determining conditions causing an existing energy supply equipment to be unsafe
  - completing documentation correctly
- solving problems in energy supply network equipment on at least one (1) of the following energy supply network systems:
  - distribution overhead system
  - distribution underground system
  - transmission overhead system
  - transmission underground system
- using at least three (3) of the following distribution/transmission equipment:
  - voltage regulation equipment
  - on load tap changers
  - energy metering
  - demand meters
  - load control

  - current transformers
  - potential transformers
- dealing with unplanned events on at least one (1) occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases, the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- generation, including:
  - primary energy sources
  - power stations
  - power station output
  - acts and legislation relating to generation
  - renewable energy sources and techniques
- transmission, including:
  - system requirements
  - principal components of a power system
  - voltage levels
  - grid systems
  - acts/legislation relating to transmission
  - future trends
- distribution, including:
  - high voltage (HV) distribution systems
  - medium/low voltage (LV) distribution systems
  - radial feeders
  - parallel feeders
  - ring main feeders
  - acts/legislation relating to distribution
- substations, including:
  - purpose
  - location
  - layout
- overhead and underground systems, including:
  - relative merits
  - applications

  - planning
  - installation
- power distribution system electrical characteristics, including:
  - transmission and distribution systems
  - inductance, capacitance and resistance
- voltage problems in a power distribution system, including:
  - LV
  - unbalanced voltages
  - voltage rises
- voltage regulation, including:
  - autotransformers with on-load tap changer (OLTC)
  - transformers with OLTC
  - static capacitors
  - load control
- control of OLTC, including:
  - regulation relays
  - control circuits
  - line drop compensation
- power distribution system faults, including:
  - type/classification of fault
  - typical causes/effects of faults
  - three phase symmetrical fault levels
  - fault level limitation
- voltage surges in a power distribution system, including:
  - lightning surges
  - switching surges
  - typical surge levels
  - surge impedance, typical values
  - significance of the system surge impedance
- metering and metered quantities, including:
  - purpose
  - energy
  - maximum demand
  - accuracy classes for metering systems
- energy and demand meters, including:
  - construction
  - operation
  - adjustments
  - testing
- metering circuits, including:

  - direct metering
  - instrument transformer metering
- electronic metering systems and recording meters, including:
  - types
  - applications
  - connections
- load control, including:
  - purpose
  - methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers determining correct operation of energy supply network protection equipment and systems and providing solutions as they apply to energy supply network protection. It encompasses working safely, reading circuit and reticulation diagrams, applying logical problem-solving processes from measurements and completing the necessary documentation.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to solve problems in energy supply network protection equipment and systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 The likely extent of work to be undertaken is envisaged from reports and/or discussions with appropriate personnel
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials that may be required for the work are established in accordance with established procedures
	1.6 Tools, equipment and testing devices needed to take measurements are obtained in accordance with established procedures and checked for correct operation and safety
2 Solve problems in energy supply network protection equipment and systems	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in strict accordance with WHS/OHS requirements and, when necessary, conducted within established safety procedures
	2.3 Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance with WHS/OHS requirements and procedures

	2.4	Safety hazards resulting from the reports identified and risk control measures devised and implemented in consultation with appropriate personnel
	2.5	Problem solving is approached methodically drawing on knowledge of energy supply network protection equipment and systems using measured and calculated values of circuit/apparatus parameters
	2.6	Circuit/apparatus/system components are dismantled, where necessary, and parts stored to protect them against loss or damage
	2.7	Circuits/components/systems are rechecked and their operational status is confirmed
	2.8	Materials/replacement parts required to solve problems are sourced and obtained in accordance with established procedures
	2.9	Effectiveness of the repair is tested in accordance with established procedures
	2.10	Apparatus is reassembled, finally tested and prepared for return to service
	2.11	Unexpected situations are dealt with safely and with the approval of authorised personnel
	2.12	Problem-solving activities are carried out without damage to apparatus, circuits the surrounding environment or services using sustainable energy practices
3 Complete and report problem solving in energy supply network protection equipment and systems	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares
	3.3	Maintenance work activities are documented in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS68A Solve problems in energy supply network protection equipment and systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRIS68 Solve problems in energy supply network protection equipment and systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- solving problems in energy supply network equipment including all of the following:
  - determining the operating parameters of existing energy supply protection equipment and systems
  - envisaging the likely extent of work from reports and discussions with appropriate personnel
  - using methodical problem-solving techniques
  - solving problems efficiently
  - altering an existing energy supply protection equipment to comply with specified operating parameters
  - developing energy supply protection equipment to comply with a specified function and operating parameters
  - determining conditions causing an existing energy supply protection equipment to be unsafe
  - completing documentation correctly
- solving problems in energy supply network systems including at least one (1) of the following:
  - distribution overhead system
  - distribution underground system
  - transmission overhead system
  - transmission underground system
- solving problems in energy supply protection equipment and systems including at least two (2) of the following:
  - over-current protection
  - earth fault protection
  - differential protection

  - oil and gas devices
  - busbar protection
  - surge protection
  - conventional relays
  - electronic relays
  - reclosers/sectionalisers
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- protection fundamentals encompassing:
  - purpose of protection
  - features of a protection scheme
- instrument transformers for protection encompassing:
  - operating principles
  - applications of current transformers
  - applications of voltage transformers
- feeder protection encompassing:
  - fuse protection
  - overcurrent and earth fault
  - sensitive earth fault
  - unit schemes
  - distance protection
  - trip/close sequences for feeders
  - recloser/sectionaliser systems
- transformer protection encompassing:
  - overheating protection
  - overcurrent protection
  - restricted earth fault protection
  - differential protection
  - oil and gas devices
- busbar protection encompassing:
  - types of fault
  - requirements of busbar protection
  - system protection
  - frame-earth protection
- surge protection encompassing:
  - voltage surges

- surge diverters
- arcing horns.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers diagnosing and rectifying faults in apparatus in energy supply and distribution systems. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply apparatus to logical fault-finding processes, implementing fault rectification, safety and functional testing, and reporting work activities and outcomes.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel
	1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety
2 Diagnose and rectify faults	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in strict accordance with WHS/OHS requirements and, when necessary, conducted within established safety procedures
	2.3 Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance with WHS/OHS requirements and procedures

	2.4	Logical diagnostic methods are applied to diagnose energy supply apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Suspected fault scenarios are tested as being the source of system problems
	2.6	Causes of faults are identified and appropriately competent person/s engaged to rectify the fault where it is outside the scope of the control system
	2.7	Faults in apparatus components are rectified to raise energy supply apparatus to its operation standard
	2.8	Apparatus is tested to verify that it operates as intended and to specified requirements
	2.9	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel and job specifications and requirements
	2.10	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is made safe in accordance with established safety procedures
	3.3	Rectification of faults is documented in accordance with established procedures
	3.4	Appropriate person/s is notified in accordance with established procedures that the system faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS69A Diagnose and rectify faults in energy supply apparatus.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- diagnosing and rectifying faults in energy supply apparatus, including:
  - applying logical diagnostic methods
  - using fault scenarios to test the cause of system faults
  - identifying faults and competency needed to rectify them
  - rectifying faults in system controls
  - verifying that the system operates correctly
  - documenting fault rectification
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases, the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- control of voltage encompassing:
  - conditions leading to voltage collapse and system disintegration
  - effects on the system of high voltage (HV)/low voltage (LV)
  - voltage control devices - voltage regulators applied to generators and synchronous phase modifiers; electromagnetic voltage regulators; series and parallel capacitors; on-load tap changers (OLTC) transformers and static VAR compensations (SVCs), such as saturated reactor (SR) compensations, thyristor controlled reactor (TCR) compensators, combined

TCR/TSCs and the production of wave-form distorting harmonics and control devices

- the importance of the location in the system of voltage control devices
- the use of graphical methods to calculate the size of VAR regulating plant
- control of power encompassing:
  - base load and spinning reserve
  - regulating machines
  - rapid start plant
  - phase shifting transformers and various forms of load shedding
  - principles and practices of automated control of individual machines
  - stations and transmission/tie-line elements
  - synchronising power
- the relationship between power and frequency encompassing:
  - limiting values
  - machine stabilising - steam by-pass, rapid valving, slip stabilisers and over speed limiting
  - use of single pole generator CB's
  - use of machine AVR's as angular stabilisers
  - damped and un-damped system oscillations
  - relationship between fault clearance times and system stability
  - calculation of critical clearance angles based on equal area criteria
- types of communication systems encompassing:
  - telephone, power line carrier, dedicated cable, microwave links and fibre optics
  - quantities and signals to be communicated
  - advantages and disadvantages of the various systems
  - equipment requirements
- transient over-voltages in power systems encompassing:
  - switching and lightning over-voltages and their effect on different plant items
  - transient over-voltage control and reduction using surge diverters, shield wires and CB control
  - insulation systems, insulation coordination, insulation grading in plant items, bushings and capacitor bushings
- factors leading to the generation of corona encompassing:
  - consequences of corona
  - reduction of corona
  - conductor bundling, grading rings and conductor surface treatment
- power system protection encompassing:
  - location of CT's in major plant items
  - earthing principles and devices
  - fault current control/limitation using neutral earthing compensators (NEC's), neutral point earth impedances, high conductivity shield wires and parallel feed interlocking
  - application of different types of protection.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRIS70 Diagnose and rectify faults in electrical energy distribution systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers diagnosing and rectifying faults in networks supplying electrical energy to consumers. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply and reticulation systems to logical fault-finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel
	1.4 The extent of faults is determined from reports and other documentation and from discussions with appropriate personnel
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety
2 Diagnose and rectify faults	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in strict accordance with WHS/OHS requirements, and when necessary, conducted within established safety procedures

	2.3	Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance with WHS/OHS requirements and procedures
	2.4	Logical diagnostic methods are applied to diagnose energy supply apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Suspected fault scenarios are tested as being the source of system problems
	2.6	Source of fault is identified and appropriately competent person/s engaged to rectify the fault where it is outside the scope of the control system
	2.7	Faults in the apparatus components are rectified to raise energy supply apparatus to its operation standard
	2.8	System is tested to verify that it operates as intended and to specified requirements
	2.9	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel and job specifications and requirements
	2.10	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is made safe in accordance with established safety procedures
	3.3	Rectification of faults is documented in accordance with established procedures
	3.4	Appropriate person/s is notified in accordance with established procedures that the system faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS70A Diagnose and rectify faults in electrical energy distribution systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRIS70 Diagnose and rectify faults in electrical energy distribution systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- diagnosing and rectifying faults in electrical energy distribution systems including:
  - applying logical diagnostic methods
  - using fault scenarios to test the cause of system faults
  - identifying faults and competency needed to rectify them
  - rectifying faults in system controls
  - verifying that the system operates correctly
  - documenting fault rectification
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases, the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- distribution system overview encompassing:
  - regulatory conditions of supply and utilisation
  - compliance with Australian Standards
  - reticulation system, including overhead/underground, urban/rural, high voltage (HV) customers and high-rise building systems
  - methods used to ensure continuity of supply

  - types of substations in current use
  - systems of distribution used, (primary and secondary)
  - voltage levels, power factor, wave-form distortion and transient loading
  - supply quality
  - load curve profiles (residential/industrial/commercial)
  - types of feeders
  - distribution systems (urban, rural single-phase systems, single wire earth return (SWER), spur, parallel and ring systems)
- overhead lines and installation encompassing:
  - industry and safety regulations
  - overhead conductors
  - conductor material
  - current rating factors (heating, voltage drops and power losses)
  - aerial bundled cables (HV and low voltage (LV))
  - covered conductors - characteristics of lines and cables, including the calculation of R, X and B for different arrangements of conductor; typical values for actual lines; transposition; models based on line length; voltage and line regulation
  - overhead line poles
  - types (wood, concrete and steel)
  - installation of poles (tooling, rake, life, labelling and sinking)
  - maintenance of poles (above and below ground)
  - pole strength and loads
  - crossarms
  - types and standard sizes
  - insulators
  - insulation types
  - types (pin, suspension or disc and shackle)
  - creepage and necessary clearances
  - arcing horns and insulator mounting
  - structure types
  - mechanical properties (working strength, maximum tension and limiting size)
  - interpretation of stringing charts
  - determination of sag (by calculations or measurement and/or tension measurement)
  - sight and wave sagging, and sag correction
  - stays
  - components and anchorage
- use of design schedules encompassing:
  - sample design problems - common design practice line, voltage, structure types used, line deviation, span sag, cross-arms, insulators and stays, wind loading and line deviation loading basic surveying

- measurement of levels, deviation angle and compass bearings
- perform survey of short distribution line extension of produce field notes

- underground cables encompassing:
  - cable types, ratings, core material, design considerations, cable dielectrics, insulating materials and abbreviations, electric stress, cable voltage drop and voltage drop calculations, cable termination, joints and installation
  - induction and eddy currents
  - cable testing and cable fault location
  - cable drawing
- voltage regulations of feeders and associated equipment encompassing:
  - terminology used - distribution system, service line, customer's terminals, customer voltage, utilisation voltage, base voltage, voltage variation and bandwidth
  - voltage limits and effects of voltage variation
  - causes of variation - inductance, capacitance and reactance of distribution lines, and transformers
  - methods of voltage control - off-load, on-load tap changers, voltage regulating relays, line drop compensation and different types of voltage regulators
  - voltage profiles - principles, effect on voltage profiles, limits of voltage, voltage drops due to LV mains transformers, tap-settings feeder and service lines
  - determining voltage drops for components within the profile
- control of voltage - conditions leading to voltage collapse and system disintegration; effects on the system of HV/LV; and voltage control devices encompassing:
  - voltage regulators applied to generators and synchronous phase modifiers
  - electromagnetic voltage regulators
  - series and parallel capacitors
  - on-load tap changer (OLTC) transformers and static VAR compensations (SVCs)
- range of devices covered by SVCs encompassing:
  - saturated reactor (SR) compensations
  - thyristor controlled reactor (TCR) compensators
  - combined TCR/TSCs
  - production of wave-form distorting harmonics and control devices
- importance of the location in the system of voltage control devices
- types of communication systems encompassing:
  - telephone, power line carrier, dedicated cable, micro-wave links and fibre optics
  - quantities and signals to be communicated
  - advantages and disadvantages of the various systems
  - equipment requirements
- transient over-voltages in power systems encompassing:
  - switching and lightning over-voltages and their effect on different plant items
  - transient over-voltage control and reduction using surge diverters, shield wires and CB control

    - insulation systems, insulation coordination, insulation grading in plant items, bushings and capacitor bushings
- the principles of operation, voltage and current range, breaking capacity and field of use of circuit breakers - bulk oil, small oil volume, air break, vacuum and SF6 (double pressure and puffer types)
- the types of isolators in use, such as duo-roll, blade and scissor type
- circuit breaker auxiliary systems encompassing:
    - direct current (d.c.) systems, including battery types, charging and protection systems and earth fault detection systems
    - SF6 conditioning, storage and handling systems.

Assessment Conditions

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRIS71 Diagnose and rectify faults in electrical energy supply transmission systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers diagnosing and rectifying faults in electrical energy transmission systems. The unit encompasses applying safe working practices, interpreting diagrams and technical data; applying knowledge of energy supply and transmission systems to logical fault-finding processes; implementing fault rectification, safety and functional testing; and reporting work activities and outcomes.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel
	1.4 The extent of faults is determined from reports and other documentation and from discussions with appropriate personnel
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety
2 Diagnose and rectify faults	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in strict accordance with WHS/OHS requirements and, when necessary, conducted within established safety procedures
	2.3 Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance with WHS/OHS

		requirements and procedures
	2.4	Logical diagnostic methods are applied to diagnose electrical energy transmission system faults employing measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Suspected fault scenarios are tested as being the source of system problems
	2.6	Source of fault is identified and appropriately competent person/s engaged to rectify the fault where it is outside the scope of the control system
	2.7	Faults in the system components are rectified to raise electrical energy transmission system to its operation standard
	2.8	System is tested to verify that it operates as intended and to specified requirements
	2.9	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel and job specifications and requirements
	2.10	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to system, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is made safe in accordance with established safety procedures
	3.3	Rectification of faults is documented in accordance with established procedures
	3.4	Appropriate person/s is notified in accordance with established procedures that the system faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS71A Diagnose and rectify faults in electrical energy supply transmission systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRIS71 Diagnose and rectify faults in electrical energy supply transmission systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- diagnosing and rectifying faults in electrical energy supply transmission systems, including:
  - applying logical diagnostic methods
  - using fault scenarios to test the source of system faults
  - identifying faults and competency needed to rectify them
  - rectifying faults in system
  - verifying that the system operates correctly
  - documenting fault rectification
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- overview of the transmission system encompassing:
  - lines, buses, transformers and cables; line/bus layouts, including single and double switching, breaker and a half systems and high voltage (HV) crossing methods
- the principles involved in HV alternating current (a.c.) transmission encompassing:
  - tower types and configurations; choice of towers or poles (economic and environmental); insulator types and configuration; types of conductors, their configuration and standard nomenclature; typical line spacing and ground clearances; line ratings based on ambient

temperature; conductor terminating and clamping equipment, including vibration damping principles and equipment

- principles involved in direct current (d.c.) transmission encompassing:
  - the economics, harmonic generation, VAR requirements and protection difficulties; types of connections and transformer requirements; advantages and disadvantages of d.c. transmission; typical overseas systems and likely (future) use in Australia
- the principles of operation, voltage and current range, breaking capacity and field of use of the following types of circuit breakers
  - bulk oil
  - small oil volume
  - air break
  - air blast
  - air puffer
  - vacuum and
  - SF6 (double pressure and puffer types)
- the types of isolators in use, such as duo-roll, blade and scissor type
- circuit breaker auxiliary systems encompassing:
  - high pressure air systems, and air storage and handling processes
  - d.c. systems, including battery types, charging and protection systems and earth fault detection systems
  - SF6 conditioning, storage and handling system
- the characteristics of lines and cables encompassing:
  - the calculation of R, X and B for different arrangements of conductor; typical values for actual lines; transposition; models based on line length; voltage and line regulation; the transmission of power (P) and VARs (Q)
- control of voltage - conditions leading to voltage collapse and system disintegration, effects on the system of high voltage (HV)/low voltage (LV), and voltage control devices including:
  - voltage regulators applied to generators and synchronous phase modifiers
  - electromagnetic voltage regulators
  - series and parallel capacitors
  - on-load tap changer (OLTC) transformers and static VAR compensations (SVCs)
- range of devices covered by SVCs, including:
  - saturated reactor (SR)compensations
  - thyristor controlled reactor (TCR) compensators
  - combined TCR/TSCs
  - production of wave-form distorting harmonics and control devices
- importance of the location in the system of voltage control devices
- use of graphical methods to calculate the size of VAR regulating plant
- types of communication systems including:
  - telephone, power line carrier, dedicated cable, micro-wave links and fibre optics; quantities and signals to be communicated; Advantages and disadvantages of the various

systems and equipment requirements

- transient over-voltages in power systems, including:
  - switching and lightning over-voltages and their effect on different plant items; transient over-voltage control and reduction using surge diverters, shield wires and CB control; insulation systems, insulation coordination, insulation grading in plant items, and bushings and capacitor bushings
- factors leading to the generation of corona encompassing:
  - consequences of corona; reduction of corona, including conductor bundling, grading rings and conductor surface treatment.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRIS72 Diagnose and rectify faults in distributed generation systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers diagnosing and rectifying faults in distributed generation systems. The unit encompasses applying safe working practices; interpreting diagrams and technical data; applying knowledge of energy supply and reticulation systems to logical fault-finding processes; implementing fault rectification, safety and functional testing; and reporting work activities and outcomes.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel
	1.4 The extent of faults is determined from reports and other documentation and from discussions with appropriate personnel
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety
2 Diagnose and rectify faults	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in strict accordance with WHS/OHS requirements and, when necessary, conducted within established safety procedures

	2.3	Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance WHS/OHS requirements and procedures
	2.4	Logical diagnostic methods are applied to diagnose distributed generation system faults employing measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Suspected fault scenarios are tested as being the source of system problems
	2.6	Causes of faults are identified and appropriately competent persons are engaged to rectify the fault where it is outside the scope of the control system
	2.7	Faults in the system components are rectified to raise distributed generation system to its operation standard
	2.8	System is tested to verify that it operates as intended and to specified requirements
	2.9	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel and job specifications and requirements
	2.10	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is made safe in accordance with established safety procedures
	3.3	Rectification of faults is documented in accordance with established procedures
	3.4	Appropriate person/s is notified in accordance with established procedures that the system faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS72A Diagnose and rectify faults in distributed generation systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRIS72 Diagnose and rectify faults in distributed generation systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- diagnosing and rectifying faults in distributed generation systems including:
  - applying logical diagnostic methods
  - using fault scenarios to test the cause of system faults
  - identifying faults and competency needed to rectify them
  - rectifying faults in system controls
  - verifying that the system operates correctly
  - documenting fault rectification
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS safety management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS

management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management systems
  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assess resources to establish and maintain WHS/OHS management systems
- distributive generation systems encompassing:
  - concept and application
  - anti-islanding control and protection
  - system monitoring and load management.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRIS73 Develop engineering solutions for energy supply power transformer problems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers developing engineering solutions to resolve problems with energy supply system protection. It encompasses working safely, applying extensive knowledge of energy supply power transformer operation and their application, gathering and analysing data, applying problem-solving techniques, and developing and documenting solutions and alternatives.

Typical transformer problems are those encountered in meeting performance requirements and compliance standards, revising a transformer operating parameters and dealing with transformer malfunctions

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Distribution Pathway Unit Group

UETTDRIS70 Diagnose and rectify faults in electrical energy distribution systems

Transmission Pathway Unit Group

UETTDRIS71 Diagnose and rectify faults in electrical energy supply transmission systems

Distributed Generation Pathway Unit Group

UETTDRIS72 Diagnose and rectify faults in distributed generation systems

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solution for energy supply power transformer problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 The extent of the transformer problem is determined from performance specifications and situation reports and in consultation with relevant personnel
	1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work

	1.5	Effective strategies are formed to ensure solution development and implementation is carried out efficiently
2 Develop engineering solutions for energy supply power transformer problems	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Knowledge of supply power transformer arrangements, operation, device characteristics and applications are applied to developing solutions to supply power transformer problems
	2.3	Parameters, specifications and performance requirements in relation to each transformer problem are obtained in accordance with established procedures
	2.4	Approaches to resolving supply power transformer problems are analysed to provide most effective solutions
	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policies
	2.6	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards
3 Test, document and implement engineering solution for energy supply power transformer problems	**3.1**	Solutions to transformer problems are tested to determine their effectiveness and modified where necessary
	3.2	Adopted solutions are documented, including instruction for their implementation that incorporates risk control measures to be followed
	3.3	Appropriately competent and qualified person/s) required to implement solutions to supply power transformer problems is coordinated in accordance with regulatory requirements and enterprise policy
	3.4	Justification for solutions used to solve supply power transformer problems is documented for inclusion in work/project development records in accordance with professional standards

Note: A license to practice in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS73A Develop engineering solutions for energy supply power transformer problems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRIS73 Develop engineering solutions for energy supply power transformer problems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- developing engineering solutions for energy supply power transformer, including:
  - understanding the extent of the transformer problems
  - forming effective strategies for solution development and implementation
  - obtaining transformer parameters, specifications and performance requirements appropriate to each problem
  - testing and finding solutions to transformer problems
  - documenting instruction for implementation of solutions that incorporate risk control measure to be followed
  - documenting justification of solutions implemented in accordance with professional standards
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- transformer construction and operating principles encompassing:
  - various types of lamination style and core construction used in single phase, three phase, double wound and auto transformers
  - different winding styles/types used in transformers

  - how input current is limited on no-load and how power is transferred from primary to secondary when a load is connected
  - using the transformation ratio to determine an unknown quantity of V, I and VA
  - significance of nameplate data items
  - operation of a transformer under load/no-load conditions
  - the reason any particular type of transformer is used in a specific application
  - safety features specified in regulatory standards with respect to transformers
  - safety features specified in regulatory standards with respect to isolating transformers
  - basic insulation resistance, continuity and winding identification tests
- transformer parameters encompassing:
  - the percentage impedance of a transformer by test
  - percentage impedance of a transformer by calculation
  - the equivalent circuit of a transformer
  - calculation of voltage regulation
  - losses that occur in a transformer
  - tests to determine losses
  - efficiency and state typical values
  - the all-day efficiency of a transformer
- cooling methods encompassing:
  - methods of natural and forced cooling
  - properties of transformer oil
  - tests performed on transformer oil
  - auxiliary equipment
  - the purpose and operation of the types of auxiliary equipment used on transformers - bushings, explosion vents, surge diverters, tap changers, conservator, breathers and desiccants, gas relays and temperature indicators
- instrument transformers encompassing:
  - construction of current transformers
  - uses and ratings of current transformers
  - construction of voltage transformers
  - uses and ratings of voltage transformers
  - safety techniques when using instrument transformers
- transformer connections encompassing:
  - vector group of a transformer from a connection diagram
  - connections of a three phase transformer to create a particular vector group
  - reasons for using the different vector groups
  - purpose of tertiary windings
  - consequences/effect of an incorrect connection
- parallel operation encompassing:
  - polarity markings for the windings of a transformer

  - conditions/restrictions for parallel operation of transformers
  - calculation of loading on transformers operating in parallel
  - connection of transformers in parallel to supply a common load
  - the consequences/effect of an incorrect connection
- harmonics in transformers encompassing:
  - how harmonics are generated in transformers
  - problems caused by harmonics in transformers
  - measurement of the harmonics in a transformer
  - methods/equipment used to overcome harmonics in transformers
- high voltage (HV) isolation encompassing:
  - the term HV
  - procedures for isolating HV apparatus
  - regulations with respect to access permits
  - clearances to be observed with respect to HV up to 33 kV
  - the term 'step' and 'touch' potential.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

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UETTDRIS74 Develop engineering solutions for energy supply system protection problems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers developing engineering solutions to resolve problems with energy supply system protection. It encompasses working safely; applying extensive knowledge of energy supply system protection operation, protection devices and their application; gathering and analysing data; applying problem-solving techniques and developing and documenting solutions and alternatives.

Typical protection problems are those encountered in meeting performance requirements and compliance standards, revising a protection operating parameters and dealing with protection malfunctions.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Distribution Pathway Unit Group

UETTDRIS70 Diagnose and rectify faults in electrical energy distribution systems

Transmission Pathway Unit Group

UETTDRIS71 Diagnose and rectify faults in electrical energy supply transmission systems

Distributed Generation Pathway Unit Group

UETTDRIS72 Diagnose and rectify faults in distributed generation systems

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solution for energy supply system protection problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 The extent of the protection problem is determined from performance specifications and situation reports and in consultation with relevant personnel
	1.4 Activities are planned to meet scheduled timelines in

		consultation with others involved in the work
	1.5	Effective strategies are formed to ensure solution development and implementation is carried out efficiently
2 Develop engineering solution for energy supply system protection	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Knowledge of supply system protection arrangements, operation, device characteristics and applications are applied to developing solutions to supply system protection problems
	2.3	Parameters, specifications and performance requirements in relation to each protection problem are obtained in accordance with established procedures
	2.4	Approaches to resolving supply system protection problems are analysed to provide most effective solutions
	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policies
	2.6	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards
3 Test, document and implement engineering solution for energy supply system protection problems	**3.1**	Solutions to protection problems are tested to determine their effectiveness and modified where necessary
	3.2	Adopted solutions are documented, including instruction for their implementation that incorporates risk control measure to be followed
	3.3	Appropriately competent and qualified person/s required to implement solutions to supply system protection problems is coordinated in accordance with regulatory requirements and enterprise policies
	3.4	Justification for solutions used to solve supply system protection problems is documented for inclusion in work/project development records in accordance with

professional standards

Note: A license to practice in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS74A Develop engineering solutions for energy supply system protection problems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRIS74 Develop engineering solutions for energy supply system protection problems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- developing engineering solutions for energy supply system protection, including:
  - understanding the extent of the protection problem
  - forming effective strategies for solution development and implementation
  - obtaining protection parameters, specifications and performance requirements appropriate to each problem
  - testing and solutions to protection problems
  - documenting instructions for implementation of solutions that incorporate risk control measure to be followed
  - documenting justification of solutions implemented in accordance with professional standards
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- protection scheme requirements encompassing:
  - requirements of a protection scheme - relationship to primary system design, purpose of protection, safety of persons, protection of plant, system instability, system break up, loss of customers, loss of revenue, protection zones, restricted schemes, unrestricted schemes,

duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity and reliability
    - components of a protection scheme - current transformers, potential transformers, summation current transformers, interposing transformers, multi-tapped transformers, all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor based relays, gas relays, thermal sensors, hardwired communication, powerline carriers systems, microwave systems, fibre optic systems, need for isolation and need for interfacing
    - protection applied to buses - overload, differential, earth leakage, structure leakage, combined schemes and protection overlap
    - protection applied to transformers - biased differential, gas, winding temperature and oil temperature
    - protection applied to single/radial lines - overcurrent, earth leakage, slow earth leakage, distance, auto reclose, sectionalising and over voltage
    - protection applied to interconnected lines - overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current comparison, distance, impedance, admittance and offset
- discrete protection systems encompassing:
    - earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination and backup protection
    - overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination and backup protection
    - alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, and over temperature schemes
- interdependent protection systems encompassing:
    - overcurrent and earth leakage intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
    - pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme and pilot supervisory techniques
    - load shedding, voltage control, parallel operation and load rejection
    - CB failure protection
    - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking
- complex protection systems encompassing:
    - distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes and bus zone
    - differential, transformer differential, bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, CT connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, CT connections, special considerations and digital systems
    - types of revenue metering
    - applications of supervisory control and data acquisition (SCADA)

- complex protection systems for communications
- harmonic control
- point on wave switching.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRRF01 Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus

Modification History

Release 2. Amendment to the Performance Evidence.

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the knowledge and application of electricity supply industry (ESI) safety rules and codes of practice for work on or near electrical apparatus. It includes the application of relevant state and territory safety rules, codes of practice and enterprise-based procedures and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

There are no prerequisite competencies to this unit.

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

outcomes.	demonstrate achievement of the element.
1 Prepare to apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	**1.1** Relevant safety rules, codes of practice and procedures are identified and obtained
	1.2 Hazards and risk control measures for specific work functions/areas are identified and obtained
	1.3 The requirement for access authority/work permits required for work are identified and obtained from appropriate personnel according to established procedures
	1.4 Safety systems and equipment for work are prepared and placed to minimise and control hazards in accordance with established procedures
2 Carry out application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	**2.1** Workplace procedures and work instructions for controlling risk are followed
	2.2 Safety rules, codes of practice and workplace procedures for induction to a worksite, are followed
	2.3 Specific workplace systems and equipment isolation procedures are followed
	2.4 Restricted workplace areas are identified, including ingress and egress procedures
	2.5 Emergency procedures are identified, including assembly areas, and communication systems, including audible alarms and processes, according to established procedures
3 Complete the application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	**3.1** Processes for completing work are applied, and access authority/work permits, where required, are completed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF01B Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRRF01 Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus

Modification History

Release 2. Amendment to the Performance Evidence.

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying safe approach distances (SAD) to:
  - personnel
  - vehicles
  - insulated mobile plant
  - non-insulated mobile plant.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- working on or near electrical network infrastructure encompassing:
  - identifying documentation, procedures and instructions for work on or near electrical apparatus
  - identifying and assessing hazards and control measures
  - SAD for work on or near electrical apparatus
- maintaining SAD for work on or near electrical apparatus.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for applying ESI safety rules, codes of practice and procedures for work on or near electrical apparatus
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRRF08 Perform EWP controlled descent escape

Modification History

Release 2. Amendment to the Performance Evidence.

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the performance of elevated work platform (EWP) controlled descent escape procedures in the workplace. It specifies the mandatory requirements for self-rescue from a raised EWP and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

There are no prerequisite competencies to this unit.

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to perform EWP	**1.1** Instruction in hazards and risk control measures for

controlled descent escape		specific work areas and work activities are identified and obtained
	1.2	Tools and emergency descent equipment are checked for safety and function to ensure accessibility according to established procedures
2 Carry out EWP controlled descent escape	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for evacuating an EWP basket employing emergency descent equipment are followed
	2.3	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete the EWP controlled descent escape procedure	**3.1**	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF08B Perform EWP controlled descent escape.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRRF08 Perform EWP controlled descent escape

Modification History

Release 2. Amendment to the Performance Evidence.

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- accessing, inspecting, securing and attaching emergency descent equipment to self in accordance with workplace procedures
- evacuating the elevated work platform (EWP) and descending to the ground in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- procedures for EWP controlled descent escape encompassing:
  - inspection of rescue equipment
  - assessing hazards to self and others
  - involvement of external emergency services as appropriate
  - safe approach distances (SAD) appropriate to EWP controlled descent escape
- procedures required for EWP controlled descent escape encompassing:
  - fitting of rescue equipment
  - controlling hazards to self and others
  - maintaining SAD for an EWP controlled descent escape
  - removing self to safe location/place of safety

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for performing EWP controlled descent escapes
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRRF09 Apply access procedures to work on or near electrical network infrastructure

Modification History

Release 2. Amendment to the Performance Evidence.

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the performance of the procedures to gain access for work on or near electrical network infrastructure in the context of transmission, distribution or rail work functions. It encompasses responsibilities for safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under sate and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

There are no prerequisite competencies to this unit.

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Prepare to apply access authority procedures for work on or near electrical network infrastructure	**1.1**	Rules/codes of practice for work on or near electrical hazards and risk control measures for specific work areas and work activities are identified and obtained
	1.2	Procedures for access authority/work permits, including roles and responsibilities, are obtained, learnt, understood and tested according to established procedures
	1.3	Access authority/work permit document is identified, obtained, learnt and understood for a specific work activity according to established procedures
2 Carry out access authority procedures for work on or near electrical network infrastructure	**2.1**	Workplace procedures for confirming personnel are appropriately qualified and fit for purpose are followed according to established procedures
	2.2	Safe approach distances (SAD) and safety measures applicable to the work activity are identified and confirmed according to established procedures
	2.3	Workplace procedures for signing on to an access authority/work permit are followed
	2.4	Workplace procedures for individuals to sign on to a specific role/function identified for the work is followed according to established procedures
	2.5	Workplace procedures confirming issue and commencement of work under an access authority/work permit document are communicated according to established procedures
3 Complete access authority procedures for work on or near electrical network infrastructure	**3.1**	Workplace procedures confirming work completion or suspension is communicated in accordance with established procedures
	3.2	Workplace procedures to ensure all personnel signed on to an access authority/work permit document are signed off in accordance with established procedures
	3.3	Workplace procedures to cancel or suspend an access authority/work permit document are performed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF09B Apply access procedures to work on or near electrical network infrastructure.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRRF09 Apply access procedures to work on or near electrical network infrastructure

Modification History

Release 2. Amendment to the Performance Evidence.

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- following workplace procedures for signing on to and off from an access authority/work permit.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- working on or near electrical network infrastructure encompassing:
  - rules/codes of practice for work on or near electrical hazards and risk control measures for specific work areas and work activities
  - documentation, roles, responsibilities and procedures for a permit to work system
  - access authority/work permit document for a specific work activity according to established procedures
  - safe approach distances (SAD) and safety measures applicable to the work activity according to established procedures
  - sign on and sign off procedures for an access authority/work permit document
  - workplace procedures to cancel or suspend an access authority/work permit document
  - workplace communication procedures to confirm work is completed or suspended
  - workplace procedures for signing on to a specific role/function identified on an access authority/work permit
- skills required to work on or near electrical network infrastructure encompassing:
  - sign on and sign off an access authority/work permit document in accordance with workplace procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for applying access procedures to work on or near electrical network infrastructures
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRRF11 Testing of connections to low voltage electricity networks

Modification History

Release 2. Amendment to the Performance Evidence.

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the performance of testing of connections to low voltage (LV) electricity networks according to AS 4741-2010 Testing of connections to electricity networks. It specifies the mandatory requirements for testing when connecting and/or reconnecting a customer's installation to an electricity supply network.

It encompasses the minimum principles and tests required to confirm that the LV supply connections are correct,

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

There are no prerequisite competencies to this unit.

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

outcomes.	demonstrate achievement of the element.
1 Prepare to perform test procedures	**1.1** Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained
	1.2 Tools and equipment needed for testing are checked for inspection date, safety and functionality
2 Carry out test procedures	**2.1** Workplace procedures and work instructions for controlling risk are followed
	2.2 Test procedures are conducted in accordance with AS 4741-2010 Testing of connections to electricity networks
	2.3 Enterprise procedures for corrective actions are followed
	2.4 Test results are documented in accordance with established enterprise procedures
3 Complete the test procedures	**3.1** Processes for reporting to authorised personnel are confirmed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF11A Testing of connections to low voltage electricity networks.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRRF11 Testing of connections to low voltage electricity networks

Modification History

Release 2. Amendment to the Performance Evidence.

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- preparing and using of test equipment
- preparing and correctly using personal protective equipment (PPE)
- testing of single phase and multi-phase connections to network operator's procedures
- documenting test results to network operator's procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- low voltage (LV) testing of network connections encompassing:
  - selection and inspection of test equipment relevant for the testing procedures
  - acceptable neutral voltage criteria
  - polarity testing
  - neutral integrity testing
  - phase rotation testing
  - phasing confirmation
  - corrective actions to network operator's procedures
  - recording and reporting results to network operator's procedures
- skills required to test LV network connection encompassing:
  - preparation and use of test equipment
  - preparation and correct use of PPE
  - testing of single phase and multi-phase connections to network operator's procedures
  - documenting test results to network operator's procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for testing of connections to LV electricity networks
- applicable documentation including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB21 Diagnose and rectify faults in substation environment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in substation in the electricity supply industry (ESI).

It includes identifying and analysing fault conditions including isolating, repairing and restoring substation control circuits.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for fault finding and rectification in power system substation environment	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented

		and monitored in accordance with workplace procedures
	1.4	Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out fault finding within the substation environment	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions/preventative actions taken in accordance with workplace procedures

	2.6	Faults in power system substation are diagnosed and rectified to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7	Faults are located, identified and affected circuits isolated in accordance with the work schedules, job requirements and workplace procedures
	2.8	Faults in power system substation control circuits are rectified in an agreed timeframe and to workplace quality standards with a minimum of waste
	2.9	Unplanned events in the diagnosis and analysis of faults are responded to in accordance with workplace procedures
	2.10	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills in accordance with requirements
	2.11	Circuit functions are restored in accordance with work schedules, job requirements and workplace procedures
	2.12	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete fault finding within the substation environment	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered, and equipment made ready for service in accordance with workplace procedures
	3.3	Worksite is cleaned and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB21A Diagnose and rectify faults in substation environment.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB21 Diagnose and rectify faults in substation environment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- diagnosing and rectifying faults on at least two (2) of the following system faults:
  - high voltage (HV) circuit breaker control system fault
  - transformer control system fault
  - direct current (d.c.) supply systems fault
  - d.c. switchgear and equipment fault
- diagnosing faults using at least three (3) of the following testers:
  - multimeters
  - tong testers
  - insulation resistance/continuity tester
  - low resistance high current tester
  - overload injection tester
  - specialist test equipment
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised low voltage (LV0 equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; and types, selection, maintenance and use of personal protective equipment (PPE)

- work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records -audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawing, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams,

d.c. traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans
    - processes of updating switching diagrams
- enterprise-specific specialised tools, including:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers and phase rotation)
    - characteristics, capabilities and application of specialised tools for a particular job
    - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
    - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
    - techniques in pre-use inspection on the serviceability of specialised tools
    - techniques in the selection, use, maintenance, care and storage of specialised tools
    - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types of enterprise-specific computer software
    - techniques in storing and retrieving data and reports from the computer
    - techniques in using the data management systems in following necessary commands and protocols in accordance with enterprise-specific procedures
    - calculation of results and data measurements using the computer

- techniques in the preparation of preliminary works creation and closure
- fault conditions and symptoms related to the plant and/or equipment type, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
  - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems, and accumulators
  - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
  - types of electrical systems, including alternating current (a.c.), d.c. and combinations of both
  - types of fault conditions - failure to operate, failure in service, = including the appropriate procedures for work on or in service plant/equipment
  - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type, including:
  - types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures; and the operating principles of these devices and components
  - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
  - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace
- substation safety practices, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substation work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
  - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP) and any WHS/OHS requirements associated with the use of EWP

- control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; and the precautions for personal protection when fighting small fires
- control of oil spills - identification, use and maintenance of spill oil control equipment and materials; and oil containment facilities and systems
- rescue and release procedures - the rescue of personnel from energised conductors, emergency descent from an EWP, and/or rescue from confined spaces
- enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
- hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors

- design principles of substation LV a.c. and d.c. supply systems, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - wiring conventions, systems and labelling conventions
  - substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
  - LV design specifications, supply requirements, electrical load assessments
  - substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, d.c. distribution panels and control systems, a.c. distribution panels and control systems, and auto change-over requirements
  - control equipment and auxiliary relays, flags and alarms
  - common panel layouts
- LV substation switching principles, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to LV substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the LV switching operator
  - operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, and purpose and procedures for operational forms
  - use, care and operation of equipment associated with LV substation switching
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV substation switching or indicating devices
  - operation of protection systems and substation equipment
  - restrictions pertaining to LV switching equipment
  - earthing LV electrical apparatus practices and procedures for access
  - LV switching techniques

- restrictions pertaining to enterprise-specific procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB22 Carry out power systems substation inspection

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to carry out power system substation inspection in the electricity supply industry (ESI).

It includes the security, electrical and environmental inspections of substations, , recording of information and reporting defective/non-compliant conditions in accordance with industry standards and workplace procedures.

The application of the skills and knowledge described in this unit may require a licence to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to carry out substation inspections	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures

	1.4	Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out substation inspections	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired, as appropriate, and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions in accordance with workplace procedures
	2.6	Substation equipment, environmental protection systems and security systems are inspected to comply with job

		requirements and workplace procedures
	2.7	Critical defects are assessed for level of safety/system impact and communicated to appropriate personnel for further action
	2.8	Minor defects and/or non-conformances are rectified in-situ
	2.9	Substation inspections are performed to ensure completion in agreed timeframes, to quality standards and in accordance with workplace procedures
	2.10	Unplanned events are responded to in accordance with workplace procedures
3 Record the outcomes of substation inspections	**3.1**	Completed work is checked against works schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered in accordance with workplace procedures, as required
	3.3	Worksite is cleaned and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and appropriate personnel are notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB22A Carry out power systems substation inspection.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB22 Carry out power systems substation inspection

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing substation inspections on at least one (1) of the following:
  - transmission substation
  - distribution substation
  - traction substation
  - zone substation
  - terminal switching stations
- performing substation inspections on all of the following:
  - substation plant and equipment
  - substation environmental systems
  - substation security systems
- performing substation inspection on at least ten (10) of the following:
  - circuit breakers
  - transformers
  - control systems
  - operating mechanism cabinets
  - voltage transformers
  - current transformers
  - surge arrestors
  - capacitor banks
  - static VAR compensator (SVC)
  - synchronous condenser
  - harmonic filters
  - rectifier transformers

  - rectifiers
  - invertors
  - negative reactors
  - energy dissipation resistors
  - disconnectors/isolators
  - earth switches
  - fault throwing switches
  - sectionalisers
  - a.c. and d.c. supply systems
  - control room environments
  - batteries
  - chargers
  - proving de-energised equipment
  - fire systems equipment
  - oil spill equipment
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures

- personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
- WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs such as equipment operation
- WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records

- enterprise-specific data management processes, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types of enterprise-specific computer software
  - techniques in storing and retrieving data and reports from the computer
  - techniques in using the data management systems in following necessary commands and protocols in accordance with enterprise-specific procedures
  - calculation of results and data measurements using the computer
  - techniques in the preparation of preliminary works creation and closure
- fault conditions and symptoms related to the plant and/or equipment type, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
  - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems; and accumulators
  - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
  - types of electrical systems, including a.c., d.c. and combinations of both
  - types of fault conditions - failure to operate, failure in service, including the appropriate procedures for work on in service plant/equipment
  - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, overpressure, under pressure, and out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type, including:
  - types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures; and the operating principles of these devices and components
  - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
  - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present

WHS/OHS hazards to persons in the workplace

- substation safety practices, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
  - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP) and any WHS/OHS requirements associated with the use of EWP
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
  - control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
  - rescue and release procedures - rescue procedures of personnel from energised conductors, emergency descent from an EWP and/or confined spaces
  - enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors and emergency response procedures
  - hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB23 Install and maintain substation direct current systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to install and maintain substation direct current systems in the electricity supply industry (ESI).

It includes installing and maintaining substation direct current (DC) systems such as main batteries, communication batteries, DC lighting systems, battery chargers, uninterrupted power supply (UPS) systems and associated control circuits in accordance with workplace procedures. It also includes diagnosing faults, replacing faulty equipment, conducting pre-commissioning/re-commissioning tests and interpreting test results against agreed specifications.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to install and/or maintain substation d.c. systems	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule

	1.6	Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out the installation and maintenance of substation d.c. systems	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures
	2.6	Substation d.c. systems are installed safely to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7	Installation of substation d.c. systems is performed in accordance with work schedules, job requirements and workplace procedures
	2.8	Maintenance of substation d.c. systems is performed in

		accordance with work schedules, job requirements and workplace procedures
	2.9	Installation and/or maintenance of substation d.c. systems are completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.10	Unplanned events or conditions are responded to in accordance with workplace procedures
	2.11	Substation d.c. systems are performance tested in accordance with workplace procedures and job specifications
	2.12	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the installation and maintenance of substation d.c. systems	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and equipment made ready for service in accordance with workplace procedures, if required
	3.3	Worksite is cleaned and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB23A Install and maintain substation direct current systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB23 Install and maintain substation direct current systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- working on at least one (1) of the following types of batteries:
  - nickel cadmium batteries
  - lead acid batteries
  - gel cell batteries
- working on at least one (1) of the following battery systems:
  - main batteries
  - communication batteries
- working on all of the following equipment:
  - battery chargers
  - d.c. control circuits
- performing at least two (2) of the following types of tests:
  - cell voltage test
  - hydrometer/specific gravity test
  - battery discharge and capacity tests
  - impedance testing
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised low voltage (LV) equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements

- safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
- work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors

- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawing, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with

switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, d.c. traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers and phase rotation)
    - characteristics, capabilities and application of specialised tools for a particular job
    - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
    - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
    - techniques in pre-use inspection on the serviceability of specialised tools
    - techniques in the selection, use, maintenance, care and storage of specialised tools
    - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risk, types, selection, maintenance and use of PPE, responsibilities and protocols and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types of enterprise-specific computer software
    - techniques in storing and retrieving data and reports from the computer
    - techniques in using the data management systems in following necessary commands and

protocols in accordance with enterprise-specific procedures
    - calculation of results and data measurements using the computer
    - techniques in the preparation of preliminary works creation and closure
- fault conditions and symptoms related to the plant and/or equipment type, including:
    - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
    - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems; and accumulators
    - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
    - types of electrical systems, including a.c., d.c. and combinations of both
    - types of fault conditions - failure to operate and failure in service, including the appropriate procedures for work on or in-service plant/equipment
    - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type, including:
    - types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures, and the operating principles of these devices and components
    - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
    - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace
- substation safety practices, including:
    - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
    - techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
    - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
    - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP), and any

WHS/OHS requirements associated with the use of EWP

- control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- control of oil spills - identification, use and maintenance of spill oil control equipment and materials, and oil containment facilities and systems
- rescue and release procedures - rescue procedures of personnel from energised conductors, emergency descent from an EWP and/or confined spaces
- enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
- hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors

- design principles of substation LV a.c. and d.c. supply systems, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - wiring conventions, systems and labelling conventions
  - substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
  - LV design specifications, supply requirements and electrical load assessments
  - substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, d.c. distribution panels and control systems, a.c. distribution panels and control systems, and auto change-over requirements,
  - control equipment and auxiliary relays, flags and alarms
  - common panel layouts.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB24 Maintain high voltage power system circuit breakers

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to maintain high voltage (HV) power system circuit breakers in the electricity supply industry (ESI).

It includes diagnosing faults, repairing and replacing HV power system circuit breakers components in accordance with workplace procedures. It also includes performing diagnostic checks, pre-commissioning tests and function checks involving circuit breakers and associated control circuits and interpreting these tests against agreed specifications.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to maintain HV power system circuit breakers	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks

		assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.4	Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared in accordance with the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures
2 Carry out maintenance on HV power system circuit breakers	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with established procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with established procedures

	2.6	Essential knowledge and associated skills are applied for the safe maintenance of HV power system circuit breakers and maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7	Maintenance of HV power system circuit breakers is performed in accordance with work schedules, job requirements and workplace procedures
	2.8	Maintenance of HV power system circuit breakers is completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.9	Unplanned events or conditions are responded to in accordance with established procedures
3 Complete the maintenance of HV power system circuit breakers	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and HV power system circuit breakers are made ready for service in accordance with workplace procedures
	3.3	Worksite is cleaned and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB24A Maintain high voltage power system circuit breakers.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB24 Maintain high voltage power system circuit breakers

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- working on at least two (2) of the following types of high voltage (HV) power system circuit breakers:
  - bulk oil circuit breakers
  - small oil volume circuit breaker
  - air blast circuit breaker
  - vacuum circuit breaker
  - gas-insulated HV switchgear (GIS) circuit breakers
  - gas circuit breakers
- working on at least two (2) of the following types of operating mechanisms:
  - spring operated mechanism
  - solenoid operated mechanism
  - hydraulic operated mechanism
  - pneumatic operated mechanism
- performing at least three (3) of the following tests:
  - insulation resistance tests
  - contact resistance tests
  - minimum close and open tests (reduced voltage tests)
  - sequence timing tests
  - contact travel/timing test
  - vibration test
  - gas pressure tests
- performing measuring or sampling tests using at least two (2) of the following:
  - gas measuring devices
  - pressure measuring devices

  - sulfur hexafluoride (SF6) gas sampling
  - oil sampling
  - SF6 moisture content (dew point)
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised low voltage (LV) equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
  - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- LV switching principles, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed
  - LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures and earthing procedures
  - PPE for LV switching
- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise

regulations pertaining to WHS/OHS policies and procedures
    - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
    - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
    - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
    - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers, maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
    - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
    - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
    - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings, including:
    - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)
    - characteristics, capabilities and application of specialised tools for a particular job
    - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
    - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
    - techniques in pre-use inspection on the serviceability of specialised tools
    - techniques in the selection, use, maintenance, and care and storage of specialised tools
    - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools

- enterprise-specific equipment installation procedures, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of HV substation equipment to be installed
  - identification of components within the equipment to be installed and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for equipment to be installed
  - control equipment and auxiliary relays, flags and alarms
  - techniques in evaluating serviceability of equipment to be installed
  - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
  - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types of enterprise-specific computer software
  - techniques in storing and retrieving data and reports from the computer
  - techniques in using the data management systems in following necessary commands and protocols in accordance with enterprise-specific procedures
  - calculation of results and data measurements using the computer
  - techniques in the preparation of preliminary works creation and closure
- fault conditions and symptoms related to the plant and/or equipment type, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
  - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives, stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems; and accumulators
  - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
  - types of electrical systems, including a.c., d.c. and combinations of both
  - types of fault conditions - failure to operate and failure in service, including the appropriate procedures for work on or in service plant/equipment
  - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type,

including:

- types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures, and the operating principles of these devices and components
- types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
- techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace

- substation safety practices, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
  - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP), and any WHS/OHS requirements associated with the use of EWP
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
  - control of oil spills - identification, use and maintenance of spill oil control equipment and materials; and oil containment facilities and systems
  - rescue and release procedures - rescue procedures of personnel from energised conductors, emergency descent from an EWP and/or confined spaces
  - enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
  - hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors
- design principles of substation LV a.c. and d.c. supply systems, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - wiring conventions, systems and labelling conventions
  - substation equipment identification and layout, wiring and schematic diagrams and other

appropriate diagrammatic representations
    - LV design specifications, supply requirements, electrical load assessments
    - substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, d.c. distribution panels and control systems, a.c. distribution panels and control systems, and auto change-over requirements
    - control equipment and auxiliary relays, flags and alarms
    - common panel layouts
- design principles of hydraulic and pneumatic operating mechanism principles, including:
    - standards, codes, Commonwealth/state/territory/local government legislation, standards, supply authority regulations and-or enterprise requirements
    - control system operating diagrams, including nomenclature, symbols and operating sequences, and units of measurement
    - fundamentals of pressure intensification, forces and energy accumulators
    - applications for substation HV equipment - circuit breaker operating mechanisms, interrupter mechanisms, pumps and compressors, GIS operating mechanisms and transformer cooling systems
    - safety precautions for work on hydraulic and/or pneumatic systems - safe working practices and procedures; identification of hazards, assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- LV substation switching principles, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to LV substation switching
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
    - role and responsibilities of the LV switching operator
    - operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, purpose and procedures for operational forms, access authorities and permits
    - use, care and operation of equipment associated with LV substation switching
    - LV switchgear – types, categories, application and operating capabilities
    - operation of LV substation switching or indicating devices
    - operation of protection systems and substation equipment
    - restrictions pertaining to LV switching equipment
    - earthing LV electrical apparatus practices and procedures for access
    - LV switching techniques
    - restrictions pertaining to enterprise -specific procedures
- circuit breaker operating principles, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to circuit breakers
    - requirements for the use of manuals, circuit breaker diagrams/plans and drawings

- operation of protection systems and substation equipment associated with circuit breakers
- use, characteristics and capabilities of specialised tools and equipment
- capabilities of operating mechanisms
- capabilities of interrupter chambers
- enterprise-specific policies and procedures for the operation of circuit breakers
- techniques in evaluating serviceability of circuit breaker operation
- control equipment and auxiliary relays, flags and alarms
- safety precautions when constructing circuit breakers - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and access for operating.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB25 Maintain high voltage power and instrument transformers

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to maintain high voltage (HV) power and instrument transformers in the electricity supply industry (ESI).

It includes conducting routine diagnostic tests within agreed specifications and maintaining associated cooling systems, controls, alarm systems and tertiary cabling and/or busbar systems in accordance with workplace procedures.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to maintain HV power and instrument transformers	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented

		and monitored in accordance with workplace procedures
	1.4	Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out the maintenance of HV power and instrument transformers	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are monitored and preventive action taken and/or appropriate authorities consulted, where necessary, in accordance with workplace procedures

	2.6	HV power system and instrument transformers are maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7	Transformers/instrument transformers are isolated and maintained in accordance with manufacturer instructions and workplace procedures
	2.8	Diagnostic measurements are performed and results interpreted, analysed and recorded in accordance with workplace procedures
	2.9	Transformers/instrument transformers are restored in accordance with workplace policies and procedures
	2.10	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the maintenance of HV power and instrument transformers	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and transformer/instrument transformer made ready for service
	3.3	Worksite is cleaned and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB25A Maintain high voltage power and instrument transformers.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB25 Maintain high voltage power and instrument transformers

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- maintaining at least one (1) of the following:
  - power transformer
  - high voltage (HV) reactor
- maintaining at least two (2) of the following:
  - auxiliary transformer
  - current transformer
  - voltage transformer
- performing at least two (2) of the following tests:
  - insulation resistance tests
  - dielectric dissipation factor tests
  - low voltage (LV) excitation checks
  - frequency response analysis
  - recovery voltage measurements
  - ratio checks
  - winding resistance tests
  - oil sampling
  - low resistance, high current connection testing
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised LV equipment, including:

  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
  - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- LV switching principles including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed
  - LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures and earthing procedures
  - PPE for LV switching
- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance including, cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental

monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers, maintenance reports; workers compensation and rehabilitation records; and first aid/medical records

- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)
  - characteristics, capabilities and application of specialised tools for a particular job
  - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
  - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
  - techniques in pre-use inspection on the serviceability of specialised tools
  - techniques in the selection, use, maintenance, and care and storage of specialised tools
  - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
  - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of HV substation equipment to be installed
  - identification of components within the equipment to be installed and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for equipment to be installed
  - control equipment and auxiliary relays, flags and alarms

- techniques in evaluating serviceability of equipment to be installed
- safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
- remote and local operating principles and conventions

- enterprise-specific data management processes, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types of enterprise-specific computer software
  - techniques in storing and retrieving data and reports from the computer
  - techniques in using the data management systems in following necessary commands and protocols in accordance with enterprise-specific procedures
  - calculation of results and data measurements using the computer
  - techniques in the preparation of preliminary works creation and closure
- fault conditions and symptoms related to the plant and/or equipment type, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
  - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems; and accumulators
  - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
  - types of electrical systems, including a.c., d.c. and combinations of both
  - types of fault conditions - failure to operate and failure in service, including the appropriate procedures for work on or in service plant/equipment
  - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type, including:
  - types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures, and the operating principles of these devices and components
  - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
  - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace

- substation safety practices including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
  - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP), and any OHS requirements associated with the use of EWP
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
  - control of oil spills - identification, use and maintenance of spill oil control equipment and materials; and oil containment facilities and systems
  - rescue and release procedures - rescue procedures of personnel from energised conductors, emergency descent from an EWP and/or confined spaces
  - enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
  - hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors
- design principles of substation LV AC and DC supply systems including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - wiring conventions, systems and labelling conventions
  - substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
  - LV design specifications, supply requirements and electrical load assessments
  - substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, d.c. distribution panels and control systems, a.c. distribution panels and control systems, and auto change-over requirements,
  - control equipment and auxiliary relays, flags and alarms
  - common panel layouts
- design principles of HV insulation systems, including:
  - insulation design principles - common materials used, electrical characteristics, thermal characteristics, uses and applications to substation HV plant and equipment, grading,

construction and cooling
    - common contaminants and their effects - internal contaminants and external contaminants
    - testing and measurement of insulation quality - test types and common measuring instruments and techniques, resistance and resistivity, losses, measurement errors, temperature corrections, and safe work practices related to testing and measurement
    - safety precautions when testing and measuring HV insulation systems - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- principles of power transformer construction and operations, including:
    - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step-down transformers, transmission and generation types
    - reactor types - shunt and series, applications and design considerations
    - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
    - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
    - insulation methods and techniques - fully insulated windings and graded insulation techniques, and oil filled and gas filled power transformers
    - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, and impedance percent
    - nameplate details - basic insulation level (BIL), tapping winding detail, physical layout, cooling ratings and physical details
    - transformer and reactor cooling types and their effects on design and rating
    - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
    - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
    - operating constraints as single units and in parallel
    - tapping windings - placement issues, tapping range, on-load tap changer (OLTC) versus off load tap changer techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), and control system characteristics
    - HV bushing selection – type, insulation system used, rating, BIL, selection criteria and testing considerations
- LV substation switching principles, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to LV substation switching
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
    - role and responsibilities of the LV switching operator
    - operational forms, access authorities and permits associated with LV switching - types of

operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits
- use, care and operation of equipment associated with LV substation switching
- LV switchgear – types, categories, application and operating capabilities
- operation of LV substation switching or indicating devices
- operation of protection systems and substation equipment
- restrictions pertaining to LV switching equipment
- earthing LV electrical apparatus practices and procedures for access
- LV switching techniques
- restrictions pertaining to enterprise-specific procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB26 Install high current d.c. equipment and switchgear

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to install high current equipment and switchgear in the electricity supply industry (ESI).

It includes installing direct current (d.c.) switchgear and other equipment, such as rectifier transformers, rectifiers, invertors, isolators and links, harmonic filters, negative reactors and energy dissipation resistors EDR's to ensure correct installation to workplace procedures and industry standards.

It also includes isolating systems and/or circuits for safe working in accordance with work plans, visual inspections and necessary checks to ensure equipment and components have been correctly installed in accordance with design and are in a safe condition for pre-commissioning tests prior to energisation, as well as updating installation data and relevant quality assurance documentation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to install high current d.c. switchgear and equipment	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures

	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out installation of high current d.c. switchgear and equipment	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions in accordance with workplace procedures
	2.6	High current d.c. switchgear and equipment are installed in accordance with work schedules, job requirements and workplace procedures

	2.7	High current d.c. switchgear and equipment are safely installed to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.8	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete installation of high current d.c. switchgear and equipment	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and equipment made ready for service
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB26A Install high current DC equipment and switchgear.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB26 Install high current d.c. equipment and switchgear

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- using testing and measuring instruments including all of the following:
  - 1500 V drop out tester
  - ammeter
  - low resistance high current
  - megger tester
  - multimeters
  - voltmeter
- using drawings and diagrams including all of the following:
  - building layouts
  - cable block and schedule diagrams
  - operating and substation arrangement diagrams wiring diagrams
  - schematic drawings
- installing at least six (6) of the following types of equipment:
  - d.c. circuit breakers
  - rectifier transformers
  - rectifiers
  - isolators and links
  - harmonic filters
  - negative reactors
  - energy dissipation resistors
- installing at least ten (10) of the following associated equipment:
  - d.c. feeders
  - surge arresters

  - isolating links
  - busbars
  - cables
  - cable supports
  - pits and enclosures
  - protection/alarm systems
  - control wiring
  - metering
  - supervisory interface
  - cabinets
  - REC
- installing at least three (3) of the following types of protection:
  - buchholz
  - frame leakage
  - overcurrent
  - earth leakage
  - reverse current
  - delta I
  - diode protection
- performing all of the following terminations and alignments:
  - cable terminations
  - busbar termination/joint
  - alignment of electrical contacts of withdrawable equipment
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised low voltage (LV) equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
  - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship

- methods of obtaining the up-to-date information on enterprise policy and procedures
- rules and regulations
- induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
- techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
- overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion

- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams, d.c. traction supply sectioning diagrams, high voltage (HV) transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)

- characteristics, capabilities and application of specialised tools for a particular job
- safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
- selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
- techniques in pre-use inspection on the serviceability of specialised tools
- techniques in the selection, use, maintenance, and care and storage of specialised tools
- identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
- techniques for the safe use of specialised power tools

- enterprise-specific equipment installation procedures, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of HV substation equipment to be installed
  - identification of components within the equipment to be installed and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for equipment to be installed
  - control equipment and auxiliary relays, flags and alarms
  - techniques in evaluating serviceability of equipment to be installed
  - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
  - remote and local operating principles and conventions
- substation d.c. circuit breaker principles, including:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the d.c. circuit breakers
  - types of d.c. circuit breakers- self and withdrawable types
  - characteristics of d.c. circuit breakers- purpose of d.c. circuit breakers and application of d.c. circuit breakers
  - principles of operation of different types of d.c. circuit breakers- arc expulsion versus arc containment, latched versus magnetically held, advantages and disadvantages of different types, fixed or withdrawable and protection/diagnostic technology
  - principles of operation of high-speed d.c. circuit breakers– characteristics and calibration
  - how d.c. circuit breakers are designated - feeder, rectifier, EDR, bus-section and negative breakers, auto-reclose or non-auto-reclose type
  - type and function of d.c. circuit breaker peripheral components - delta I relays, busbar, control wiring, trunk and associated plug/receptacle
  - identification, characteristics, application and care of d.c. circuit breaker components - holding coils, closing coils, contactors, resistors, arc chutes, blow-out coils, arcing contacts, main contacts, braids, moving arm, pole face, arcing horns, electronic cards,

dashpots, fingers, diode strings, fuses, insulators, latching mechanisms, motors, wiring and relays

- characteristics, application and care of hand and specialised tools used on d.c. circuit breakers - combination/multigrips/long nose pliers, side cutters, screwdrivers, wire strippers, crimpers, knife, hacksaw, hammers, mallets, levels, tape measures, spanners, T-wrench, pistol drills, battery drills, heat gun, de-soldering tools and soldering iron/torches, Allen keys, socket spanners, gauges, feeler gauges and specialist tools supplied by the manufacturer
- characteristics, application and care of test and measurement instruments used on d.c. CB's - multimeters, tong testers, ammeters, voltmeters, ohmmeters, test lamps, high and low voltage insulation resistance/ continuity testers, earth resistance tester, ductor and drop-out test sets

- installation of substation d.c. circuit breakers and associated equipment, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation of substation d.c. circuit breakers
  - safety precautions when installing substation d.c. circuit breakers - safe operation procedures; WH/?OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of PPE; permit to work systems and isolation procedures; safe working practices when using specialised equipment; and emergency response and rescue, including first aid
  - use and interpretation of technical manuals and diagrams - manufacturer/enterprise manuals; block, wiring and schematic diagrams; 1500 V sectioning diagrams; substation HV operating diagrams; substation arrangement diagrams and layout drawings; technical/manufacturer specifications; and maintenance instructions/schedules
  - techniques in the safe installation of d.c. circuit breakers CB's
- LV substation switching principles including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to LV substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the LV switching operator
  - operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, purpose and procedures for operational forms, and access authorities and permits
  - use, care and operation of equipment associated with LV substation switching
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV substation switching or indicating devices
  - operation of protection systems and substation equipment
  - restrictions pertaining to LV switching equipment
  - earthing LV electrical apparatus practices and procedures for access
  - LV switching techniques
  - restrictions pertaining to enterprise-specific procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB27 Maintain high current d.c. equipment and switchgear

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to maintain high current direct current (d.c.) equipment and switchgear in the electricity supply industry (ESI).

It includes maintaining d.c. switchgear and other equipment, such as rectifier transformers, rectifiers, invertors, isolators and links, harmonic filters, negative reactors and energy dissipation resistors (EDR)s. It also includes diagnosing of faults and replacement and repair in accordance to workplace procedures and industry standards, isolating systems and/or circuits for safe work in accordance with work plans, visual inspections and necessary checks to ensure safe energisation, and updating of maintenance data and relevant quality assurance documentation.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to maintain high current d.c. switchgear and equipment	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel

	1.3	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and in accordance with workplace procedures
	1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others and for completion within acceptable timeframes, to agreed quality standards and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out the maintenance of high current d.c. switchgear and equipment	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures

	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions in accordance with workplace procedures
	2.6	Maintenance and repair of high current d.c. switchgear and equipment are maintained and repaired in accordance with works schedules, job requirements and workplace procedures
	2.7	High current d.c. switchgear and equipment are safely maintained to ensure completion in agreed timeframes, to quality standards and minimum waste in accordance with workplace procedures
	2.8	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the maintenance of high current d.c. switchgear and equipment	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and equipment made ready for service
	3.3	Worksite is cleaned and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB27A Maintain high current DC equipment and switchgear.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB27 Maintain high current d.c. equipment and switchgear

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- maintaining high current direct current (d.c) switchgear and equipment using all of the following:
  - multimeters
  - low resistance high current
  - megger tester
  - ammeter
  - voltmeter
  - 1500 V drop out tester
  - wiring diagrams
  - schematic drawings
  - operating and substation arrangement diagrams
  - building layouts
  - cable block and schedule diagrams
- maintaining at least six (6) of the following types of equipment:
  - direct current circuit breakers
  - rectifier transformers
  - rectifiers
  - isolators and links
  - harmonic filters
  - negative reactors
  - energy dissipation resistors
- maintaining at least ten (10) of the following associated equipment:
  - d.c. feeders
  - surge arresters

  - isolating links
  - busbars
  - cables
  - cable supports
  - pits and enclosures
  - protection/alarm systems
  - control wiring
  - metering
  - supervisory interface
  - cabinets
  - REC
- using all of the following:
  - cable terminations
  - busbar termination/joint
  - alignment of electrical contacts of withdrawable equipment
- dealing with unplanned events on at least one occasion

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised low voltage (LV) equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
  - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policy and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue

management, and training and competency development - understanding and promotion

- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers, maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawing, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams, d.c. traction supply sectioning diagrams, high voltage (HV) transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)
  - characteristics, capabilities and application of specialised tools for a particular job
  - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
  - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
  - techniques in pre-use inspection on the serviceability of specialised tools
  - techniques in the selection, use, maintenance, and care and storage of specialised tools

  - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
  - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of HV substation equipment to be installed
  - identification of components within the equipment to be installed and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for equipment to be installed
  - control equipment and auxiliary relays, flags and alarms
  - techniques in evaluating serviceability of equipment to be installed
  - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
  - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types of enterprise-specific computer software
  - techniques in storing and retrieving data and reports from the computer
  - techniques in using the data management systems in following necessary commands and protocols in accordance with the enterprise-specific procedures
  - calculation of results and data measurements using the computer
  - techniques in the preparation of preliminary works creation and closure
- substation d.c circuit breaker principles, including:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the d.c. circuit breakers
  - types of d.c. circuit breakers - self and withdrawable types
  - characteristics of d.c. circuit breakers - purpose of d.c. circuit breakers and application of d.c. circuit breakers
  - principles of operation of different types of d.c. circuit breakers - arc expulsion versus arc containment, latched versus magnetically held, advantages and disadvantages of different types, fixed or withdrawable and protection/diagnostic technology
  - principles of operation of high-speed d.c. circuit breakers – characteristics and calibration
  - how d.c. circuit breakers are designated - feeder, rectifier, EDR, bus-section and negative breakers, auto-reclose or non-auto-reclose type
  - type and function of d.c. circuit breaker peripheral components - delta I relays, busbar,

control wiring, trunk and associated plug/receptacle

- identification, characteristics, application and care of d.c. circuit breakers components - holding coils, closing coils, contactors, resistors, arc chutes, blow-out coils, arcing contacts, main contacts, braids, moving arm, pole face, arcing horns, electronic cards, dashpots, fingers, diode strings, fuses, insulators, latching mechanisms, motors, wiring and relays
- characteristics, application and care of hand and specialised tools used on d.c. circuit breakers - combination/multigrips/long nose pliers, side cutters, screwdrivers, wire strippers, crimpers, knife, hacksaw, hammers, mallets, levels, tape measures, spanners, T-wrench, pistol drills, battery drills, heat gun, de-soldering tools and soldering iron/torches, Allen keys, socket spanners, gauges, feeler gauges and specialist tools supplied by the manufacturer
- characteristics, application and care of test and measurement instruments used on d.c. circuit breakers - multimeters, tong testers, ammeters, voltmeters, ohmmeters, test lamps, HV and LV insulation resistance/continuity testers, earth resistance tester, ductor and drop-out test sets

- maintenance of substation d.c. circuit breakers and associated equipment, including:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the maintenance of d.c. circuit breakers
  - requirements for the use and interpretation of manuals, system diagrams/plans and drawings - 1500V sectioning diagrams, substation HV operating diagrams, substation arrangement diagrams and layout drawings, technical/manufacture specifications and maintenance instructions/schedules
  - relationship and function of d.c. circuit breaker equipment/component interface - d.c. circuit breaker frame, connection fingers, associated busbar, physical arrangements and clearances
  - safety precautions when undertaking maintenance procedures on d.c. circuit breakers - safe working practices; WHS/OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of PPE; permit to work systems and isolation procedures; types and function of specialised equipment; safe working practices when using specialised equipment; and emergency response and rescue, including first aid
  - techniques in maintenance of d.c. circuit breakers - closing and opening operations, range settings, adjustments and calibration, spring settings, main contact arrangement and auxiliary contact arrangement, arc chute inspection and procedures, basic fault finding and repair/adjustment techniques, control cards, their uses, application and fault finding, and earthing requirements and techniques
  - techniques in testing and commissioning of d.c. circuit breakers - supply authority regulations and/or enterprise requirements, standards and procedures
- installation of substation d.c. circuit breakers and associated equipment including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation of substation d.c. circuit breakers
  - safety precautions when installing substation d.c. circuit breakers - safe operation procedures; WHS/OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of PPE; permit to work systems

and isolation procedures; safe working practices when using specialised equipment; and emergency response and rescue, including first aid

- use and interpretation of technical manuals and diagrams - manufacturer/enterprise manuals, block, wiring and schematic diagrams, 1500 V sectioning diagrams, substation HV operating diagrams, substation arrangement diagrams and layout drawings, technical/manufacturer specifications and maintenance instructions/schedules
- techniques in the safe installation of d.c. circuit breakers.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB29 Maintain capacitor bank equipment for voltage regulation

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to maintain capacitor bank equipment for voltage regulation in the electricity supply industry (ESI).

It includes maintaining and repairing substation voltage regulating equipment and is restricted to high voltage (HV) capacitor banks and associated switching reactors and the inspection, recording of information, testing and measurement of the associated control circuits. It also includes the range of acceptance tests and discharge requirements for complete units within a substation in accordance with industry standards and workplace procedures, fault diagnosis and return to service tests and interpretation of test results against agreed specifications.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to maintain voltage regulating equipment (capacitor banks)	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6 Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7 Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8 Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace

		procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out the maintenance of voltage regulating equipment (capacitor banks)	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures
	2.6	Capacitor bank is isolated, discharged and maintained in accordance with workplace procedures
	2.7	Defective capacitor elements are identified, located and replaced in accordance with manufacturer instructions and workplace procedures
	2.8	Capacitor network is balanced and pre-service tests and measurements completed in accordance with workplace procedures
	2.9	Voltage regulating equipment (capacitor banks) are safely maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.10	Unplanned events are responded to in accordance with workplace procedures
3 Complete the maintenance of voltage regulating	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and

equipment (capacitor banks)		anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and the capacitor bank is made ready for service
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB29A Maintain capacitor bank equipment for voltage regulation.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB29 Maintain capacitor bank equipment for voltage regulation

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- maintaining at least one (1) of the following systems:
  - double star neutral current unbalance type
  - voltage unbalance type, single star
- maintaining at least two (2) of the following components:
  - internal discharge resistor cans
  - external resistor type
  - switching reactors
  - neutral unbalance current transformer
- performing at least three (3) of the following types of tests:
  - insulation resistance tests
  - capacitance tests
  - unbalance current/voltage tests
  - primary injection tests
  - high voltage (HV) direct current d.c. withstand tests
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised low voltage (LV) equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working

practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
    - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- enterprise-specific policies and procedure instructions, including:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures
    - rules and regulations
    - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
    - techniques when deal with others - working in teams, customer relation, and complaint and issues procedures
    - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
    - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
    - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
    - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
    - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
    - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
    - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
    - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
    - title box - description of parts and version control
- enterprise-specific switching diagrams and drawing, including:
    - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and

catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, d.c. traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)
    - characteristics, capabilities and application of specialised tools for a particular job
    - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
    - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
    - techniques in pre-use inspection on the serviceability of specialised tools
    - techniques in the selection, use, maintenance, and care and storage of specialised tools
    - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types of enterprise-specific computer software
    - techniques in storing and retrieving data and reports from the computer
    - techniques in using the data management systems in following necessary commands and protocols in accordance with enterprise-specific procedures

- calculation of results and data measurements using the computer
- techniques in the preparation of preliminary works creation and closure

- fault conditions and symptoms related to the plant and/or equipment type, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
  - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems; and accumulators
  - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
  - types of electrical systems, including alternating current (a.c.), d.c. and combinations of both
  - types of fault conditions - failure to operate and failure in service, including the appropriate procedures for work on or in service plant/equipment
  - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type, including:
  - types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures, and the operating principles of these devices and components
  - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
  - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace
- substation safety practices, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
  - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP) and any

WHS/OHS requirements associated with the use of EWPs

- control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- control of oil spills - identification, use and maintenance of spill oil control equipment and materials; and oil containment facilities and systems
- rescue and release procedures - the rescue procedures for personnel from energised conductors, emergency descent from an EWP and/or confined spaces
- enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
- hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors

- principles of power transformer construction and operations, including:
  - applications of static reactive plant in HV networks, including voltage control, volt-ampere reactive VAR control and transient response capacity
  - types of static reactive plant, including HV capacitors, HV reactors, static VAR compensators and combinations of these
  - operating characteristics and operational constraints, including point on wave switching issues
  - ratings, cooling systems and control systems and ancillary equipment used
  - configurations and system layout, including single star, double star and bridge type
  - typical protection systems used, including neutral unbalance current and neutral unbalance voltage
  - techniques used when balancing elements within static reactive plant
  - safety precautions when testing and maintaining HV static reactive plant - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB30 Maintain high voltage power system static VAR compensators (SVC)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to maintain high voltage (HV) power system static VAR compensators (SVC) in the electricity supply industry (ESI).

It includes diagnosing faults, replacing and repairing high voltage power system static VAR compensator components. It also includes diagnostic and return to service tests and interpreting tests results against agreed specifications.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETTDRSB25 Maintain high voltage power and instrument transformers

UETTDRSB29 Maintain capacitor bank equipment for voltage regulation

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to maintain HV power system SVC	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel

	1.3	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.4	Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out maintenance on HV power system SVC	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to

		immediate authorised personnel for directions in accordance with workplace procedures
	2.6	HV power system SVC are safely maintained and repaired to ensure completion in agreed timeframes, to quality standards and minimum waste in accordance with workplace procedures
	2.7	Pre-service tests and measurements are conducted in accordance with enterprise procedures
	2.8	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the maintenance of HV power system SVC	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and HV power system SVC is made ready for service
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB30A Maintain high voltage power system static VAR compensators (SVC).

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB30 Maintain high voltage power system static VAR compensators (SVC)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- maintaining at least two (2) of the following types of equipment:
  - static VAR compensator (SVC) power transformer
  - SVC auxiliary transformer
  - capacitors
  - reactors
  - cooling equipment
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:

- standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
- methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
- specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
- personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
- WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
- WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records

- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawing, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - low voltage (LV) system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, high voltage (HV) transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)
  - characteristics, capabilities and application of specialised tools for a particular job
  - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
  - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and or hiring arrangements
  - techniques in pre-use inspection on the serviceability of specialised tools
  - techniques in the selection, use, maintenance, and care and storage of specialised tools
  - identifying WHS/OHS hazards, and assessing and controlling risks associated with their

use
    - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types of enterprise-specific computer software
    - techniques in storing and retrieving data and reports from the computer
    - techniques in using the data management systems in following necessary commands and protocols in accordance with enterprise-specific procedures
    - calculation of results and data measurements using the computer
    - techniques in the preparation of preliminary works creation and closure
- principles of power system SVC, including:
    - applications of static reactive plant in HV networks, including voltage control, VAR control and transient response capacity
    - types of static reactive plant, including HV capacitors, HV reactors, SVC and combinations of these
    - operating characteristics and operational constraints, including point on wave switching issues
    - ratings, cooling systems and control systems and ancillary equipment used
    - configurations and system layout, including single star, double star and bridge type
    - typical protection systems used, including neutral unbalance current and neutral unbalance voltage
    - techniques used when balancing elements within static reactive plant
    - safety precautions when testing and maintaining HV static reactive plant - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS

risks; types, selection, maintenance and use of PPE.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB31 Maintain high voltage power system synchronous condensers

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to maintain high voltage (HV) power system synchronous condensers in the electricity supply industry (ESI).

It includes diagnosing faults and replacing and repairing high voltage power system synchronous condenser components. It includes diagnostic and pre-commissioning tests involving synchronous condensers and interpreting these tests against agreed specifications.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to maintain HV power system synchronous condensers	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented

		and monitored in accordance with workplace procedures
	1.4	Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Equipment, tools and personal protective equipment (PPE) required for work is identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out maintenance on HV power system synchronous condensers	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures

	2.6	HV power system synchronous condensers are safely maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7	Pre-service tests and measurements are conducted in accordance with enterprise procedures
	2.8	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the maintenance of HV power system synchronous condensers	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and the power system synchronous condenser made ready for service
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage or in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB31A Maintain high voltage power system

synchronous condensers.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB31 Maintain high voltage power system synchronous condensers

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- maintaining at least one (1) of the following windings:
  - stator winding
  - rotor winding
- maintaining the following system:
  - cooling system
- maintaining at least one (1) of the following systems:
  - control system
  - alarm system
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised low voltage (LV) equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
  - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- LV switching principles, including:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
- requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed
- LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures and earthing procedures
- PPE for LV switching

- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers, maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams

    - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings, including:
    - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, high voltage (HV) transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)
    - characteristics, capabilities and application of specialised tools for a particular job
    - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
    - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
    - techniques in pre-use inspection on the serviceability of specialised tools
    - techniques in the selection, use, maintenance, and care and storage of specialised tools
    - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management

- requirements for the use of manuals, substation diagrams/plans and drawings
- types of enterprise-specific computer software
- techniques in storing and retrieving data and reports from the computer
- techniques in using the data management systems in following necessary commands and protocols in accordance with enterprise-specific procedures
- calculation of results and data measurements using the computer
- techniques in the preparation of preliminary works creation and closure

- fault conditions and symptoms related to the plant and/or equipment type, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
  - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems; and accumulators
  - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
  - types of electrical systems, including alternating current (a.c.), d.c. and combinations of both
  - types of fault conditions - failure to operate and failure in service including the appropriate procedures for work on in service plant/equipment
  - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type, including:
  - types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures, and the operating principles of these devices and components
  - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
  - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace
- substation safety practices, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substations work, including responsibilities regarding the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of

extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes; and the safety issues relating to clearances from energised conductors

- requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP), and any WHS/OHS requirements associated with the use of EWPs
- control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- control of oil spills - identification, use and maintenance of spill oil control equipment and materials; and oil containment facilities and systems
- rescue and release procedures - the rescue procedures of personnel from energised conductors, emergency descent from an EWP and/or confined spaces
- enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
- hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors

- synchronous condenser principles, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to synchronous condensers
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of synchronous condensers installed
  - identification of components within the synchronous condensers and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for synchronous condensers
  - techniques in evaluating serviceability of synchronous condensers operation
  - safety precautions when testing and measuring synchronous condensers - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; safe working clearances and communicating worksite procedures
  - operating characteristics and operational constraints, including point on wave switching issues
  - ratings, cooling systems and control systems and ancillary equipment used
  - configurations and system layout, including single star, double star and bridge type
  - typical protection systems used, including neutral unbalance current and neutral unbalance voltage
  - techniques used when balancing elements within static reactive plant
  - safety precautions when testing and maintaining HV static reactive plant - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB32 Maintain power transformer on load tap changers (OLTC)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to maintain power transformer on load tap changers (OLTC) in the electricity supply industry (ESI).

It includes maintaining, repairing and overhauling substation voltage regulating equipment restricted to resistor and reactor type high speed on load tap changers but does not include the main tank tap selector mechanism. It also includes inspecting, recording of information, testing and measuring of associated control circuits, range of acceptance tests required on installed complete units within the parent power transformer, diagnostic and pre-commissioning checks and tests involving tap changers and interpreting these results against agreed specifications.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETTDRSB25 Maintain high voltage power and instrument transformers

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain voltage regulating equipment (tap changers)	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are

		identified and communicated with relevant personnel
	1.3	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.4	Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out the maintenance of voltage regulating equipment (tap changers)	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures

	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures
	2.6	Oil circuits are isolated and tap changer vessels drained in accordance with workplace and environmental protection procedures
	2.7	Tap changer is withdrawn and maintained in accordance with manufacturer instructions and workplace procedures
	2.8	Pre-service tests and measurements are conducted in accordance with workplace procedures
	2.9	Voltage regulating equipment (tap changers) are safely maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste
	2.10	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the maintenance of voltage regulating equipment (tap changers)	**3.1**	Completed work is checked against works schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and transformer made ready for service
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB32A Maintain power transformer on load tap changers (OLTC).

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB32 Maintain power transformer on load tap changers (OLTC)

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- maintaining at least one (1) of the following systems:
  - high speed resistor type and drive mechanism
  - high speed reactor type and drive mechanism
- maintaining at least two (2) of the following pieces of equipment:
  - live tank diverter switch
  - dead tank diverter switch
  - tap selector
- performing at least three (3) of the following tests:
  - insulation resistance tests
  - transition resistor tests
  - contact resistance tests
  - sequence timing tests
  - ratio checks
  - winding resistance tests
  - oil sampling
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship

  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers, maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawings and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - low voltage (LV) system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, high voltage (HV) transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
  - legislation, standards, codes, supply authority regulations and specific enterprise

regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)
    - characteristics, capabilities and application of specialised tools for a particular job
    - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
    - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and or hiring arrangements
    - techniques in pre-use inspection on the serviceability of specialised tools
    - techniques in the selection, use, maintenance, and care and storage of specialised tools
    - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of (PPE); responsibilities and protocols; and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types of enterprise-specific computer software
    - techniques in storing and retrieving data and reports from the computer
    - techniques in using the data management systems in following necessary commands and protocols in accordance with the enterprise-specific procedures
    - calculation of results and data measurements using the computer
    - techniques in the preparation of preliminary works creation and closure
- principles of power transformer high speed on-load tap changers (OLTC), including:
    - selector types and applications for HV power transformers
    - diverter switch types and applications for HV power transformers, including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag and pennant cycle

- ratings and construction principles
- operating mechanism types, stored energy systems and associated control systems
- operating principles and operating sequences of selectors and diverters
- measurement requirements, including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
- online diagnostic tools and devices
- ancillary equipment, including online filters, over pressure relays and devices
- testing requirements, including cycle timing, differential delay, energy accumulator mechanical and operational tests, and control system functional tests
- safety precautions when testing and maintaining HV power transformer OLTC - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB33 Install high voltage plant and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to install high voltage (HV) plant and equipment in the electricity supply industry (ESI).

It includes conducting pre-commissioning tests within agreed specifications, installing earthing systems, tertiary cabling and/or busbar systems. It does not include associated protection systems.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan the installation of HV plant and equipment	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6 Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order

	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out the installation of HV plant and equipment	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures
	2.6	Earthing requirements are identified and installed or confirmed installed in accordance with workplace procedures
	2.7	Foundations and other appropriate civil works are constructed and/or confirmed ready for the erection of HV plant and equipment
	2.8	HV plant and equipment is erected and associated HV connections, low voltage (LV) controls and supplies are installed in accordance with manufacturer instructions and workplace procedures
	2.9	Remedial actions are taken to overcome shortfalls

		encountered in the work schedule in accordance with job requirements and workplace procedures
	2.10	Pre-commissioning checks are performed and HV plant and equipment made ready for service in accordance with workplace procedures
	2.11	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	2.12	Essential knowledge and associated skills are applied for the safe installation of HV plant and equipment to ensure completion in agreed timeframes, to quality standards and minimum waste in accordance with workplace procedures
	2.13	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the installation of HV plant and equipment	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and installed power system HV plant and equipment made ready for service
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified
	3.6	Associated drawings, schematics and diagrams are updated to reflect work as executed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB33A Install high voltage plant and equipment.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB33 Install high voltage plant and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- installing at least two (2) of the following pieces of equipment:
  - power transformer
  - high voltage (HV) reactor (series or parallel)
  - auxiliary transformer
  - current transformer
  - voltage transformer
  - capacitor bank
  - circuit breaker
  - high current direct current (d.c.) switchgear and/or equipment
- installing at least two (2) of the following pieces of associated equipment:
  - disconnector
  - fault throwing switch
  - earth switch
  - earth grid connections
  - surge arrestor
  - neutral earthing transformer
  - resistor bank
  - busbar
- performing at least three (3) of the following tests:
  - insulation resistance tests
  - dielectric dissipation factor tests
  - low voltage (LV) excitation checks
  - continuity checks

  - ratio checks
  - winding resistance tests
  - gas pressure checks
  - timing checks
  - contact resistance checks
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised LV equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
  - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- LV switching principles, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed
  - LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures and earthing procedures
  - PPE for LV switching
- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire=fighting procedures, fatigue

management, and training and competency development - understanding and promotion

- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawings and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams, d.c. traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)
  - characteristics, capabilities and application of specialised tools for a particular job
  - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
  - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and or hiring arrangements
  - techniques in pre-use inspection on the serviceability of specialised tools
  - techniques in the selection, use, maintenance, and care and storage of specialised tools

    - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types of enterprise-specific computer software
    - techniques in storing and retrieving data and reports from the computer
    - techniques in using the data management systems in following necessary commands and protocols in accordance with enterprise-specific procedures
    - calculation of results and data measurements using the computer
    - techniques in the preparation of preliminary works creation and closure
- fault conditions and symptoms related to the plant and/or equipment type, including:
    - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
    - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems; and accumulators
    - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
    - types of electrical systems, including alternating current (a.c.), d.c. and combinations of both
    - types of fault conditions - failure to operate and failure in service, including the

appropriate procedures for work on or in service plant/equipment
    - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type, including:
    - types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures, and the operating principles of these devices and components
    - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
    - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace
- substation safety practices, including:
    - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
    - techniques in the use of protective apparatus and apparel for substations work, including responsibilities regarding the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
    - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
    - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP) and any WHS/OHS requirements associated with the use of EWP
    - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
    - control of oil spills - identification, use and maintenance of spill oil control equipment and materials, and oil containment facilities and systems
    - rescue and release procedures - the rescue procedures of personnel from energised conductors, emergency descent from an EWP and/or confined spaces
    - enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
    - hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors
- design principles of substation LV a.c. and d.c. supply systems, including:

- standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
- wiring conventions, systems and labelling conventions
- substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
- LV design specifications, supply requirements and electrical load assessments
- substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, d.c. distribution panels and control systems, a.c. distribution panels and control systems, and auto change-over requirements
- control equipment and auxiliary relays, flags and alarms
- common panel layouts

- design principles of hydraulic and pneumatic operating mechanism principles, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, standards, supply authority regulations and/or enterprise requirements
  - control system operating diagrams, including nomenclature, symbols and operating sequences, and units of measurement
  - fundamentals of pressure intensification, forces and energy accumulators
  - applications for substation HV equipment - circuit breaker operating mechanisms, interrupter mechanisms, pumps and compressors, gas insulated switchgear (GIS) operating mechanisms and transformer cooling systems
  - safety precautions for work on hydraulic and/or pneumatic systems - safe working practices and procedures; identification of hazards, assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- principles of power transformer construction and operations, including:
  - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step-down transformers, transmission and generation types
  - reactor types - shunt and series, applications and design considerations
  - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
  - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
  - insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
  - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, and impedance percent
  - nameplate details - basic insulation level (BIL), tapping winding detail, physical layout, cooling ratings and physical details
  - transformer and reactor cooling types and their effects on design and rating
  - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
  - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common

methods of diagrammatic representation of winding configuration
    - operating constraints as single units and in parallel
    - tapping windings - placement issues, tapping range, on-load tap changer (OLTC) versus off load tap changer techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), and control system characteristics
    - HV bushing selection – type, insulation system used, rating, BIL, selection criteria and testing considerations
- circuit breaker operating principles, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to circuit breakers
    - requirements for the use of manuals, circuit breaker diagrams/plans and drawings
    - operation of protection systems and substation equipment associated with circuit breakers
    - use, characteristics and capabilities of specialised tools and equipment
    - capabilities of operating mechanisms
    - capabilities of interrupter chambers
    - enterprise specific policies and procedures for the operation of circuit breakers
    - techniques in evaluating serviceability of circuit breaker operation
    - control equipment and auxiliary relays, flags and alarms
    - safety precautions when constructing circuit breakers - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and access for operating

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB34 Carry out surveys using thermovision techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to carry out surveys using thermovision techniques in the electricity supply industry (ESI).

It includes thermographic inspections of transmission/distribution systems and/or substation equipment. It also includes surveying, inspecting, recording information and reporting of defective/non-compliant conditions in accordance with workplace procedures.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to carry out thermographic surveys	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures

	1.4	Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Equipment, tools and personal protective equipment (PPE) required for work is identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out thermographic surveys	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired, as appropriate, and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures
	2.6	Circuit load conditions are assessed, relevant personnel and/or organisations consulted and appropriate circuit

		adjustments made prior to survey in accordance with workplace procedures
	2.7	Substation equipment and/or transmission/distribution systems are surveyed, joints, connections and components surveyed and assessed in accordance with workplace procedures
	2.8	Non-conformance defects are assessed for level of safety/system impact and communicated to appropriate personnel for further action in accordance with workplace procedures
	2.9	Circuits are restored to pre-survey conditions and appropriate personnel/organisations informed in accordance with workplace procedures
	2.10	Thermographic surveys are performed to ensure completion in agreed timeframes, to quality standards and minimum waste in accordance with workplace procedures
	2.11	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Record the outcomes of thermographic surveys	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered if appropriate
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB34A Carry out surveys using thermovision techniques.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB34 Carry out surveys using thermovision techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing surveys using thermovision techniques in one (1) of the following substations:
  - transmission substation
  - distribution substation
  - traction substation
  - zone substation
- performing surveys using thermovision techniques on at least one (1) of the following:
  - substation apparatus and equipment
  - transmission/distribution system conlow resistance high currents and components
- performing surveys using thermovision techniques on at least three (3) of the following associated equipment:
  - disconnectors
  - transmission/distribution system conlow resistance high currents
  - mid-span joints
  - bolted palms and connections
  - terminations
  - jumpers
  - pot heads
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- enterprise specific policies and procedure instructions, including:

- responsibilities and duty of care of employer and employee relationship
- methods of obtaining the up-to-date information on enterprise policies and procedures
- rules and regulations
- induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
- techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
- overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion

- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility of maintenance including, cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawings and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - low voltage (LV) system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, high voltage (HV) transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:

  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)
  - characteristics, capabilities and application of specialised tools for a particular job
  - safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
  - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
  - techniques in pre-use inspection on the serviceability of specialised tools
  - techniques in the selection, use, maintenance, and care and storage of specialised tools
  - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
  - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of HV substation equipment to be installed
  - identification of components within the equipment to be installed and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for equipment to be installed
  - control equipment and auxiliary relays, flags and alarms
  - techniques in evaluating serviceability of equipment to be installed
  - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
  - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types of enterprise-specific computer software
  - techniques in storing and retrieving data and reports from the computer
  - techniques in using the data management systems in following necessary commands and protocols in accordance with the enterprise-specific procedures
  - calculation of results and data measurements using the computer
  - techniques in the preparation of preliminary works creation and closure
- fault conditions and symptoms related to the plant and/or equipment type, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions

and systems

- interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems; and accumulators
- interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
- types of electrical systems, including alternating current (a.c.), d.c. and combinations of both
- types of fault conditions - failure to operate and failure in service, including the appropriate procedures for work on or in service plant/equipment
- types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks

- substation equipment components and materials related to the plant and/or equipment type, including:
  - types of components - complete unit of plant and/or equipment, replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures and the operating principles of these devices and components
  - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
  - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace
- substation safety practices, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substations work, including responsibilities regarding the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
  - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP) and any WHS/OHS requirements associated with the use of EWP
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
  - control of oil spills - identification, use and maintenance of spill oil control equipment

and materials; and oil containment facilities and systems

- rescue and release procedures - the rescue procedures of personnel from energised conductors, emergency descent from an EWP and/or confined spaces
- enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
- hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors

- design principles of HV insulation systems, including:
  - insulation design principles - common materials used, electrical characteristics, thermal characteristics, uses and applications to substation HV plant and equipment, grading, construction and cooling
  - common contaminants and their effects - internal contaminants and external contaminants
  - testing and measurement of insulation quality - test types and common measuring instruments and techniques, resistance and resistivity, losses, measurement errors, temperature corrections, and safe work practices related to testing and measurement
  - safety precautions when testing and measuring HV insulation systems - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use PPE
- principles of power transformer construction and operations, including:
  - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step-down transformers, transmission and generation types
  - reactor types - shunt and series, applications and design considerations
  - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
  - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
  - insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled, and gas filled power transformers
  - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships and impedance percent
  - nameplate details - basic insulation level (BIL), tapping winding detail, physical layout, cooling ratings and physical details
  - transformer and reactor cooling types and their effects on design and rating
  - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
  - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
  - operating constraints as single units and in parallel
  - tapping windings - placement issues, tapping range, on-load tap changer (OLTC) versus off load tap changer techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), and control system

characteristics
    - HV bushing selection – type, insulation system used, rating, BIL, selection criteria and testing considerations
- circuit breaker operating principles, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to circuit breakers
    - requirements for the use of manuals, circuit breaker diagrams/plans and drawings
    - operation of protection systems and substation equipment associated with circuit breakers
    - use, characteristics and capabilities of specialised tools and equipment
    - capabilities of operating mechanisms
    - capabilities of interrupter chambers
    - enterprise-specific policies and procedures for the operation of circuit breakers
    - techniques in evaluating serviceability of circuit breaker operation
    - control equipment and auxiliary relays, flags and alarms
    - safety precautions when constructing circuit breakers - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and access for operating.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB35 Maintain discrete control and protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the isolation, inspection, testing, adjustment, repair, refurbishment and/or overhaul and functional checks of discrete protection and control devices. It includes the requirements to prove the functionality of discrete devices, such as direct current (d.c.) supplies, overcurrent, overload, earth fault, transformer temperature controls, alarms and indication circuits.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the maintenance of discrete protection and control devices	**1.1** Work schedules, including drawings, plans, requirements procedures and material lists, are acquired, analysed and the extent of work determined
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to

		ensure safe systems of work are followed and according to established procedures
	1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, acquired and confirmed safe and in technical working order
	1.7	Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work
	1.8	Personnel participating in the work, including plant operators and contractors, are fully briefed, their respective responsibilities explained and coordinated, and appropriate authorisation checked in accordance with established procedures
	1.9	Worksite is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures
2 Carry out the maintenance of discrete protection and control devices	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with established procedures
	2.4	Lifting, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures

	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.6	Maintenance of discrete protection and control devices is undertaken according to requirements and established procedures
	2.7	Data is analysed and compared with compliance specifications to ensure completion of the maintenance work is within an agreed timeframe and according to requirements
	2.8	Essential knowledge and associated skills are applied for the safe maintenance of discrete protection and control devices to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.9	Unplanned events or conditions are responded to in accordance with established procedures
3 Complete the maintenance of discrete protection and control devices	**3.1**	Final inspections of discrete protection and control devices are undertaken and checked against the work schedule to ensure they comply with all requirements, including all required documentation
	3.2	Anomalies between the work schedule requirements and measured performance are reported and solutions identified in accordance with established procedures
	3.3	Safe working documentation is surrendered and transformer made ready for service
	3.4	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.5	Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures
	3.6	Required work completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB35A Maintain discrete control and protection systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB35 Maintain discrete control and protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- undertaking functional checks and testing of discrete control and protection devices including all of the following:
  - isolate discrete protection
  - control and indications
  - overcurrent and earth fault relays
  - direct current (d.c.) supplies
  - trip and control circuits
  - alarms and indications
  - function test of discrete devices
- inspecting discrete control and protection devices including at least three (3) of the following:
  - neutral displacement
  - no-volt changeover
  - discrete auto-reclose
  - d.c. frame leakage
  - oil surge (site maintenance)
  - voltage regulation
  - parallel operation
  - thermal overloads
  - transformer temperature control devices
  - CEL fail
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- principles of isolation and tagging procedures associated with protection testing encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
  - requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
  - techniques in documenting isolations
  - techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
  - techniques in the installation and maintenance procedures protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- maintenance procedures associated with discrete protection schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the maintenance procedures
  - requirements for the use of maintenance manuals, system diagrams/plans and drawings
  - techniques in maintenance procedures – planning, policy and testing techniques
  - close out requirements
- relay manufacturer specifications encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of relay manufacturer specifications
  - requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
  - types, function and characteristics of specific relays - differences between specific relays used for the same functionality
- safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants, encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the handling and disposing of insulation or heat dissipation materials used in power distribution devices
  - identification of environmental issues associated with the handling and disposing of

insulation materials

- safety precautions when handling and disposing of heat dissipation materials - safe working practices; WHS/OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures; types and function of specialised equipment; safe working practices when using specialised equipment; and emergency response and rescue, including first aid
- techniques in the handling and disposing of insulation materials - polychlorinated biphenyls (PCB), asbestos, insulating Oil and sulfur hexafluoride (SF6) gas.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB36 Commission discrete control and protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the commissioning/testing of discrete protection and control systems and includes isolation, inspection, monitoring, testing, adjustment and functional checks on systems, such as overcurrent, overloads, earth fault, alarms and controls.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETTDRSB25 Maintain high voltage power and instrument transformers

UETTDRSB29 Maintain capacitor bank equipment for voltage regulation

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the commissioning/testing of discrete protection and control systems	**1.1** Work schedules, including drawings, plans, requirements procedures and material lists, are acquired, analysed and the extent of work determined
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Hazards are identified, work health and safety

(WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures

1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures

1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule

1.6 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, acquired and confirmed safe and in technical working order

1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work

1.8 Personnel participating in the work, including plant operators and contractors, are fully briefed, their respective responsibilities explained and coordinated, and appropriate authorisation checked in accordance with established procedures

1.9 Worksite is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures

2 Carry out the commissioning/testing of discrete protection and control systems

2.1 WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures

2.2 Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures

2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures

2.4 Lifting, use of power tools/equipment techniques and

		practices are safely exercised in accordance with established procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.6	Commissioning/testing of discrete protection and control systems is undertaken according to requirements and established procedures
	2.7	Data is analysed and compared with compliance specifications to ensure commissioning/testing of the discrete system is completed within an agreed timeframe and according to requirements
	2.8	Essential knowledge and associated skills are applied for the safe commissioning/testing of discrete protection and control systems to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.9	Unplanned events or conditions are responded to in accordance with established procedures
3 Complete the commissioning/testing of discrete protection and control systems	**3.1**	Final inspections and functional testing of the discrete protection and control systems are completed and checked to ensure compliance with all requirements
	3.2	Anomalies between requirements and measured performance are reported and solutions identified in accordance with established procedures
	3.3	Safe working documentation is surrendered and discrete protection and control systems are made ready for service
	3.4	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.5	Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures
	3.6	Required work completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in

accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB36A Commission discrete control and protection systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB36 Commission discrete control and protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- undertaking final inspections and functional testing of the discrete protection and control systems including all of the following:
  - isolating protection
  - inspecting controls and alarms with discrete protection and control systems
  - isolating current transformers
  - calibrating discrete protection and control relays
  - carrying out function tests (trips and alarms) on discrete protection and control systems without assistance
  - writing reports on the performance of discrete protection and control systems
- undertaking commissioning and testing of discrete control and protection devices including at least three (3) of the following:
  - overcurrent
  - frame leakage
  - cooling controls
  - buchholz/surge protection
  - direct current (d.c.) supplies control
  - neutral displacement circuit breaker reclose
  - d.c. frame leakage
  - CEL fail
  - earth fault
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- commissioning procedures associated with discrete protection schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy and testing techniques
  - close out requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB37 Maintain power system distribution field devices

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the maintenance of automatic circuit reclosers (ACRs), gas switches, regulators and line capacitors; and communication systems, including mobile phones and trunked mobile radio (TWR). It includes secondary injection, timing and function tests, and proving correct tripping, reclosing and remote operation.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the maintenance of distribution field devices	**1.1** Work schedules, including drawings, plans, requirements, procedures and material lists, are acquired, analysed and the extent of work determined
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according

		to established procedures
	1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, acquired and confirmed safe and in technical working order
	1.7	Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work
	1.8	Personnel participating in the work, including plant operators and contractors, are fully briefed, their respective responsibilities explained and coordinated, and appropriate authorisation checked in accordance with established procedures
	1.9	Worksite is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures
2 Carry out the maintenance of distribution network field devices	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with established procedures
	2.4	Lifting, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to

		immediate authorised personnel for directions according to established procedures
	2.6	Essential knowledge and associated skills are applied for the safe maintenance of distribution field devices to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.7	Maintenance, including testing of distribution field devices, is undertaken according to requirements and established procedures
	2.8	Unplanned events or conditions are responded to in accordance with established procedures
3 Complete the maintenance of distribution network field devices	**3.1**	Functional checks of distribution field devices are completed and all work checked against the requirements to ensure compliance
	3.2	Anomalies between the work schedule requirements and measured performance are reported and solutions identified in accordance with established procedures
	3.3	Safe working documentation is surrendered and transformer made ready for service
	3.4	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.5	Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures
	3.6	Approved copies of the maintenance of distribution network field devices documents are issued and records updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB37A Maintain power system distribution field devices.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB37 Maintain power system distribution field devices

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- undertaking functional checks and testing of power system distribution field devices including all of the following:
  - assembly
  - functional checks
  - applying device settings
  - secondary injections
  - timing
  - remote operations
- maintaining power system distribution field devices including at least three of the following:
  - Automatic circuit reclosers (ACRs)
  - gas switches
  - regulators
  - line capacitors
  - mobile phone systems
  - trunked mobile radio (TMR) systems
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)

    - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- principles of isolation and tagging procedures associated with protection testing encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
    - requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
    - techniques in documenting isolations
    - techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
    - techniques in the installation and maintenance procedures protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- maintenance procedures associated with discrete protection schemes encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the maintenance procedures
    - requirements for the use of maintenance manuals, system diagrams/plans and drawings
    - techniques in maintenance procedures – planning, policies and testing techniques
    - close out requirements
- relay manufacturer specifications encompassing:
    - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of relay manufacturer specifications
    - requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
    - types, function and characteristics of specific relays - differences between specific relays used for the same functionality
- safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants, encompassing:
    - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the handling and disposing of insulation or heat dissipation materials used in power distribution devices
    - identification of environmental issues associated with the handling and disposing of insulation materials
    - safety precautions when handling and disposing of heat dissipation materials - safe working practices; WHS/OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures; types and function of specialised equipment; safe working practices when using specialised equipment; and emergency response and rescue, including first aid
    - techniques in the handling and disposing of insulation materials - polychlorinated

biphenyls (PCB), asbestos, insulating oil and sulfur hexafluoride (SF6) gas.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSB38 Commission power system distribution field devices

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the commissioning of automatic circuit reclosers (ACRs), gas switches, regulators and line capacitors; and communication systems, including mobile phones and trunked mobile radio (TMR). It also includes communication with the operating authority, testing, clearing after testing and energising using techniques that are acceptable to the operating authority.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETTDRSB37 Maintain power system distribution field devices

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the commissioning of distribution field devices	**1.1** Work schedules, including drawings, plans, requirements, procedures and material lists, are acquired, analysed and the extent of work determined
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

	1.3	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures
	1.5	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, acquired and confirmed safe and in technical working order
	1.6	Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work
	1.7	Personnel participating in the work, including plant operators and contractors, are fully briefed, their respective responsibilities explained and coordinated, and appropriate authorisation checked in accordance with established procedures
	1.8	Worksite is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures
2 Carry out the commissioning of distribution network field devices	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with established procedures
	2.4	Lifting, use of power tools/equipment techniques and practices are safely exercised in accordance with

		established procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks monitored and preventive action taken and/or appropriate authorities consulted, where necessary, in accordance with established procedures
	2.6	Commissioning, including testing of distribution field devices, is undertaken according to requirements and established procedures
	2.7	Data is analysed and compared with compliance specifications to ensure completion of the maintenance work is within an agreed timeframe and according to requirements
	2.8	Essential knowledge and associated skills are applied for the safe commissioning of distribution network field devices to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.9	Unplanned events or conditions are responded to in accordance with established procedures
3 Complete the commissioning of distribution network field devices	**3.1**	Functional checks of distribution field devices are completed and all work checked against the requirements to ensure compliance
	3.2	Anomalies between the work schedule requirements and measured performance are reported and solutions identified in accordance with established procedures
	3.3	Safe working documentation is surrendered and transformer made ready for service
	3.4	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.5	Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures
	3.6	Documents and records related to the distribution field devices are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB38A Commission power system distribution field devices.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSB38 Commission power system distribution field devices

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- undertaking all of the following:
  - applying device settings
  - secondary injections
  - timing
  - remote operations
  - earthing checks
  - calibrations
- undertaking commissioning and testing of power system distribution field devices including at least three (3) of the following:
  - automatic circuit reclosers (ACRs)
  - gas switches
  - regulators
  - line capacitors
  - mobile phone systems
  - trunked mobile radio (TMR) systems
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- commissioning procedures associated with distribution protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations

and/or enterprise requirements associated with the commissioning procedures
- requirements for the use of commissioning manuals, system diagrams/plans and drawings
- techniques in commissioning procedures – planning, policies and testing techniques
- close out requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSO45 Operate and monitor system SCADA equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the skills and knowledge to operate, monitor and control high voltage (HV) apparatus on the network via supervisory control and data acquisition (SCADA) control.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan and prepare for the operation, monitoring and control of system equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of the switching program, are reviewed

		and determined
	1.2	System requirements are established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	System and associated equipment operational prerequisites are identified and established in accordance with manufacturer and/or enterprise/site procedures
	1.4	System monitoring and control procedures are discussed with and/or directed to appropriate personnel in order to ascertain the project brief
	1.5	Operational parameters are ascertained from established policies, procedures and specifications
	1.6	Work roles and tasks are allocated according to requirements and individual competencies
	1.7	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.8	Liaison and communication issues with others/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.9	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.10	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out and coordinate the operation, monitoring and control of system equipment	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	Decisions concerning the operation, monitoring and control of system equipment are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	The effectiveness of the finished project is analysed in accordance with requirements and established

		procedures
	2.4	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.6	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.7	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the operation, monitoring and control of system equipment	**3.1**	Final review of the operation, monitoring and control of system equipment is undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO45A Operate and monitor system SCADA equipment.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSO45 Operate and monitor system SCADA equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements , including the use of risk control measures
- applying sustainable energy principles and practices
- performing on at least three (3) occasions the following:
  - evidence of switching programs involving the operation and monitoring of system equipment via supervisory control and data acquisition (SCADA)
- performing on at least two (2) occasions the following:
  - evidence of unplanned switching events involving the operation and monitoring of system equipment via SCADA
- demonstrating the following:
  - extracting data used in the analysis of network loading trends
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- SCADA systems encompassing:
  - SCADA system features and applications - industries in which SCADA systems are used, associate benefits of the package, features and facilities of different SCADA packages, and hardware requirements
  - reading mimics and animated graphics
  - trending - analysis of process to select data, viewing data and graphical representation of selected information, trend graphs and data matching
  - alarm logging - analysing select data, and corrective action of alarm status
- personal computer operating systems encompassing:
  - basic function, components and concepts

  - operating systems in use
  - system installation and configuration
- computers applications encompassing:
  - application software types
  - configurations and preferences
  - use of particular software packages - word processor, spreadsheet, database, presentation software, web/document publisher, computer-aided drafting (CAD)/drawing packages, email client and business management
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, a distribution and a rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders, and the HV equipment associated with substations
- enterprise-specific policies and procedure instructions encompassing:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing ;and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or

equipment training, emergency and evacuation training, and training as part of broader programs such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- power distribution network documentation encompassing:
    - requirements for the use of manuals, system diagrams/plans and drawings; and for plans, such as work method statements for the control of WHS/OHS risks
    - types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different diagrams and documentation on low voltage (LV) and high voltage (HV) systems - overhead distribution extensions, underground distribution extensions, distribution substations and street lighting systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment, and SCADA equipment currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, relevant modelling tools, drawings and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETTDRSO46 Monitor and control the field staff activities

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the monitoring of permit to work requests, dispatching personnel, responding to alarms, travel and activity monitoring of field personnel, monitoring work activities of field personnel against work schedule.

It also includes contingency skills, response to third-party enquiries, out of hour, response to man down alarm, tracking of field personnel (remote area), monitoring activities on system equipment, monitoring availability of assets (maintain a log), monitor equipment status, coordinating field activities, controlling and authorising field works, and preparing incident reports.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

To minimise incidents related to safe systems of work, entry into this unit requires at a minimum that an individual has demonstrated or possesses relevant technical engineering discipline competencies of at least AQF level 3. It is intended that an individual will be expected to perform with a large degree of autonomy in decision making, whilst in an individual environment.

This may include immediate response to protect human life, adverse effect on safety, security of supply or the integrity of the assets.

NOTE: Typically the following disciplines provide direct entry; electrical or instrumentation, fitting and turning or mechanical trade.

Where an individual does not possess or demonstrate the requisite entry requirement, an equivalent bridging program should be used to ensure equivalence of entry.

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for the monitoring and controlling of field activities	**1.1** Work schedules, plans, requirements and established procedures are detailed and analysed and, if necessary, the extent of the preparation of the work determined for planning and coordination
	1.2 Shift handover detail is received, understood and confirmed according to established procedures
	1.3 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.4 Risk control measures for identified hazards are prioritised, implemented and evaluated against the work schedule
	1.5 Salient system constraints are communicated to relevant persons and identified for worksites in accordance with established procedures
	1.6 Operational and commercial requirements are communicated to stakeholders in accordance with established procedures
	1.7 Work health and safety (WHS)/occupational health and safety (OHS), environmental and sustainable energy policies and procedures related to the work are identified to ensure safe systems of work are followed
	1.8 Relevant work permits are secured to coordinate the performance of work according to requirements and established procedures
	1.9 Liaison and communication with authorised personnel, authorities, clients and land owners is performed/actioned and activities are coordinated to

		carry out work
2 Undertake monitoring and controlling of field activities	**2.1**	WHS/OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents and hazards
	2.2	Work is performed and coordinated in accordance with work schedules and established procedures
	2.3	WHS/OHS risks are monitored and action taken according to established procedures
	2.4	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and established procedures
	2.5	Essential knowledge and associated skills are applied in an agreed timeframe and to quality standards efficiently according to requirements and established procedures
	2.6	Solutions to non-routine problems are identified and actioned using essential knowledge and associated skills according to requirements
	2.7	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer to community and industry standards
3 Complete monitoring and controlling of field activities	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies are reported and solutions identified in accordance with established procedures
	3.2	Relevant work permit(s) and field activities are signed off and the status of plant, equipment and personnel movements recorded and handover procedures are conducted in accordance with established procedures
	3.3	Shift handover detail is relayed and confirmed according to established procedures
	3.4	Work completion records, reports, documentation and information is confirmed, processed and appropriate personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO46A Monitor and control the field staff activities.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

Assessment Requirements for UETTDRSO46 Monitor and control the field staff activities

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing all the following:
  - evaluating, responding to and reporting threats to systems operation/security
  - identifying and reporting abnormal conditions of the network
  - using relevant field permit to work systems
  - responding correctly to alarms
  - monitoring field work activities
  - communicating effectively in the workplace
  - operating communications equipment
  - interpreting technical drawings and symbols
  - following emergency response procedures
  - utilising relevant WHS/OHS legislation, regulations, codes of practice, policies and procedures
  - applying planning skills
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- personal computer operating systems encompassing:
  - basic function, components and concepts
  - operating systems in use
  - system installation and configuration
- transmission, distribution and rail systems encompassing:

  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements such WHS/OHS and electrical safety
  - techniques in receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment encompassing:
  - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission - Commonwealth/state/territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
  - identification, assessment, control and monitoring of the hazards to the environment

associated with the powerline industry
    - workplace environment quality standards enterprise plan - setting of acceptable emission level limits from power plant equipment, impact of the enterprise activities on air and water quality, nature, impact and level of emissions from power plant, power distribution and transmission equipment and network infrastructure (noise generation, noxious gas emissions, greenhouse gas production, electromagnetic emissions, electromagnetic field strength, oil leakage and insulation breakdown products)
    - provision of manufacturer and supplier information, such as material safety data sheets (MSDS)
    - gathering of environment management information
    - maintenance of environmental records
    - risk assessment and its management in powerline industry
    - maintenance strategies for environment protection programs - developing processes for promoting, maintaining and improving environmental impact in the workplace; and identifying techniques for evaluating and reviewing environment protection education and training programs and elements of an effective environment protection management system; Environment Protection Authority (EPA) consultation and accident/incident investigations
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
    - particular reference to state and territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV system switching principles, including switching authorisation procedures encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings
    - types and characteristics of HV systems and equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances (SAD)
    - responsibilities and protocols for identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- low voltage (LV) system switching principles, including switching authorisation procedures, encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings

  - types and characteristics of LV systems and equipment to be switched
  - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, SAD, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- coordinating and directing switching instructions encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the coordination and directing of switching schedules instructions
  - relationship between the operating authorities and HV customers, and operating agreements
  - techniques in coordinating and directing HV and LV switching of electrical networks
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
  - responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
  - techniques in gathering, collating and confirming data on switching procedures
- HV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to HV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the HV switching operator
  - operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits; hazard/risk assessments, purpose and procedure for operational forms; access authorities and hazard/risk assessments
  - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - HV switchgear – types, categories, application and operating capabilities

- operation of HV overhead switching or indicating devices - fuses, disconnect fuses, load switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, airbreaks switches, disconnects, live line clamps, phasing sticks and phasing tester
- operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications
- restrictions pertaining to HV switching equipment
- procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing, and HV switching techniques
- operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

- LV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to LV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
  - operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, airbreak switches, disconnects, live line clamps, phasing sticks and phasing tester
  - operation of protection systems and substation equipment - fault levels and settings; types and applications, protection systems and substation equipment fault levels and settings; types and applications
  - restrictions pertaining to LV switching equipment
  - procedures for the isolation of LV distributions main and working earths
  - earthing LV electrical apparatus practices and procedures for access authority issuing
  - LV switching techniques
  - operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- enterprise-specific policies and procedure instructions encompassing:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures

- rules and regulations
- induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
- techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
- overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion

- enterprise-specific WHS/OHS instructions encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise OHS policies and procedures
  - specific enterprise personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records, manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- effective management and communication encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to assisting in effective management and communication
  - enterprise operational principles - workplace WHS/OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
  - relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to WHS/OHS training, methods of addressing barriers such as literacy and cultural differences, and provisions relating to WHS/OHS issue resolution
  - techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, and range of support services and expertise available
  - techniques in managing relationships - identifying problems; methods of conflict resolution; methods of consultation, communication, negotiation and mentoring; and strategies for positive feedback
  - techniques in leadership in achieving enterprise strategic and operational plans

- techniques in managing relationships under stress - stress management.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

AHCARB322 Access trees for inspection

Modification History

Release	Comments
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 5.0.

Application

This unit describes the skills and knowledge required to access trees for inspection. It does not describe the skills and knowledge required to access trees to conduct arboricultural work, tree pruning or removal.

The unit applies to individuals who work under broad direction and take responsibility for their own work. They use discretion and judgement in the selection, allocation and use of available resources and for solving problems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Unit Sector

Arboriculture (ARB)

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare site and inspect equipment	1.1 Confirm access to site and scope of works according to workplace procedures 1.2 Undertake a site-specific job safety analysis (JSA), record and implement control measures according to workplace safety procedures 1.3 Confirm availability of first aid and rescue personnel, equipment

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	and procedures 1.4 Conduct pre-operational preparations and safety checks, on ropes, harnesses, tools and climbing equipment 1.5 Select, check and use personal protective equipment
2. Prepare to access tree	2.1 Inspect tree to determine efficient low-risk access route and climbing method through discussion with work team 2.2 Select and prepare climbing equipment according to manufacturer instructions, workplace health and safety regulations and industry standards 2.3 Configure climbing equipment components to form functional tree climbing system appropriate to the access method selected 2.4 Tie, dress, set and finish climbing knots and hitches according to climbing system 2.5 Conduct pre-climb checks of configured systems to ensure compatibility, safety and function according to selected climbing system, industry standards and manufacturer instructions
3. Access tree safely to work position	3.1 Select and install suitable anchor points according to access method selected 3.2 Use climbing equipment to ascend tree to suitable work positions within crown using safe access route 3.3 Undertake transitions between attachment points safely to reach suitable work positions 3.4 Communicate with work team during operations according to work site and environmental conditions using methods agreed with work team 3.5 Maintain awareness and clearances to avoid power lines according to workplace safety procedures
4. Descend from tree	4.1 Descend tree using climbing equipment in a controlled manner 4.2 Remove all climbing equipment safely in a controlled manner according to manufacturer instructions 4.3 Inspect, clean, maintain and store climbing and safety equipment according to manufacturer instructions

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Writing	• Accurately record and complete workplace job safety analysis using clear language, grammar and industry terminology

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
AHCARB322 Access trees for inspection	AHCARB312 Use standard climbing techniques to access trees	Title changed Prerequisite unit removed Performance criteria clarified Foundation skills added Assessment requirements updated	Equivalent

Links

Companion Volumes, including Implementation Guides, are available at VETNet: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

Assessment Requirements for AHCARB322 Access trees for inspection

Modification History

Release	Comments
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 5.0.

Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit.

There must be evidence that the individual has used climbing techniques to access at least 2 structurally different trees, including:

- confirmed access to site and scope of works
- identified workplace health, safety and environmental hazards and completed a job safety analysis (JSA) or safe work method statement (SWMS) for the site and activities
- confirmed availability of first aid and rescue personnel, equipment and procedures
- conducted pre-operational safety checks, on ropes, harnesses, tools and equipment
- selected and used personal protective equipment (PPE) and safety equipment during works
- inspected tree and discussed with work team to determine a safe and efficient access route
- selected and prepared climbing equipment for accessing tree
- ascended, navigated though and descended tree canopy using harness and lanyard and safe anchor points, following safe climbing techniques, including:
  - moving rope with prusik technique
  - trunk walking technique
  - use of foot ascenders
- tied, dressed, set and finished the following climbing knots and hitches, including:
  - alpine butterfly
  - blake's hitch
  - scaffold knot
  - double fisherman's bend/prusik loop
  - girth hitch
  - English prusik hitch
  - marlinspike hitch
  - munter hitch

  - clove hitch
  - double-overhand stopper knot
  - bowline
  - running bowline
- communicated with work team during operations using agreed communication procedures
- maintained safe clearances from power lines
- removed all access equipment in a controlled manner on descend from tree
- inspected, cleaned, maintained and stored climbing and personal protective equipment according to manufacturer instructions.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- assessing and selecting different methods for climbing trees
- workplace health, safety, site, environmental and traffic control measures, including:
  - completing JSAs and SWMS for site-specific risks
  - purpose of first aid and rescue personnel, equipment and procedures
  - pre-operational and safety checks, on ropes, harnesses, tools and equipment
  - PPE used when climbing
- inspection, use and maintenance of arborist climbing equipment, including:
  - ropes and their characteristics
  - rope type, construction and materials
  - rope inspection and failure conditions
  - uses of climbing ropes
  - triple-locking carabiners
  - climbing hardware
- purpose, function, selection, tying, dressing, setting, checking and finishing of arborist knots used for climbing techniques
- safety when climbing trees, including:
  - safe working limits of ropes and equipment
  - defects in ropes, tools and equipment
  - climbing harnesses and lanyards
- hazards to avoid when climbing within the tree canopy, including:
  - safe distances from electrical power lines
  - tree structural defects
  - the presence of insects or other animals
  - deciding on low-risk access routes
- environmental impacts of tree access methods, including:
  - potential impact on tree of various climbing methods
  - impact on animal habitat or food source

- communications strategies used when climbing with a work team, including:
  - voice
  - hand
  - electronic communications
- climbing techniques using ropes and harnesses, including:
  - moving rope with prusik technique
  - trunk walking
  - foot ascenders
  - safe transitions between points of attachment
  - low-risk anchor points
  - controlled descent operations
- controlled removal of access equipment
- procedures for inspecting, cleaning, maintaining and storing climbing equipment.

Assessment Conditions

Assessment of the skills in this unit of competency must take place under the following conditions:

- physical conditions:
  - two trees with different canopy structures as stipulated in the performance evidence
- resources, equipment and materials:
  - standard climbing kit
  - harness
  - arborist communications equipment
  - personal protective equipment
  - first aid and emergency response equipment
- specifications:
  - workplace and manufacturer instructions for safe operation, cleaning and storage of the equipment specified in the assessment conditions
- relationships:
  - work team.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards. In particular, assessors must have:

- arboriculture vocational competencies at least to the level being assessed
- current arboriculture industry skills directly relevant to the unit of competency being assessed.

Links

Companion Volumes, including Implementation Guides, are available at VETNet: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

AHCCHM201 Apply chemicals under supervision

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Application

This unit of competency describes the skills and knowledge required to handle, transport, and apply chemicals under supervision using workplace specified chemicals and application equipment.

The unit applies to individuals working in a broad range of job contexts who undertake defined routine activities under supervision. They exercise limited autonomy within established and well-known parameters, providing solutions to a limited range of predictable problems.

State or territory licensing, legislative or certification requirements apply in some jurisdictions.

Pre-requisite Unit

Nil

Unit Sector

Chemicals (CHM)

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare to handle chemicals	1.1 Confirm the activity related to chemical handling to be undertaken with supervisor

Elements	**Performance Criteria**
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	1.2 Identify and select tools and equipment required according to supervisor instructions 1.3 Identify health and safety hazards and risks and apply controls according to supervisor instructions and workplace procedures 1.4 Select, ensure serviceability, fit and use personal protective equipment (PPE)
2. Check application equipment	2.1 Carry out pre-operational checks of application equipment and identify and replace any damaged or worn components or report to supervisor 2.2 Prepare application equipment for use according to workplace practice and safe chemical handling processes
3. Handle and transport chemicals	3.1 Confirm safety precautions for the handling and transport of chemicals with supervisor 3.2 Handle and transport chemicals according to chemical label, safety data sheets and supervisor instructions
4. Prepare chemical for application	4.1 Interpret and apply chemical label instructions according to safety data sheets for the chemical or substance being used 4.2 Select and use appropriate mixing equipment 4.3 Measure, mix and load application equipment with chemical according to application rates 4.4 Clear chemical spills according to chemical label and supervisor instructions 4.5 Check that output of application equipment is correct and in accordance with chemical application plan
5. Apply chemicals	5.1 Assess and record weather conditions and forecasts prior to and during application according to workplace requirements 5.2 Apply chemical safely according to chemical application plan, chemical label and supervisor instructions 5.3 Monitor conditions for application and take appropriate action when conditions are unsuitable according to workplace procedures 5.4 Minimise risks to others, product integrity and the environment prior to and during application
6. Finalise work	6.1 Clean and store PPE and application equipment in accordance with manufacturers and health and safety in the workplace

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	requirements 6.2 Dispose of excess chemicals and clean containers in accordance with label instructions and regulatory requirements 6.3 Complete incident reports according to workplace procedures 6.4 Complete chemical application records according to workplace procedures 6.5 Store unused chemical and products according to workplace procedures 6.6 Adhere to all re-entry requirements for treated areas

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	• Interpret instructions, chemical labels and safety documentation to identify relevant and key information to apply to mixing and application of chemicals
Writing	• Use clear language and correct concepts and terminology when reporting incidents and completing chemical application records
Numeracy	• Perform basic mathematical calculations when measuring and mixing chemicals and checking chemical application equipment
Oral Communication	• Use clear language, concepts, tone and pace appropriate when confirming chemical application parameters with supervisor
Get the work done	• Follow clearly defined instructions and sequencing, and monitors own progress for the task, seeks assistance when necessary

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status

AHCCHM201 Apply chemicals under supervision Release 2	AHCCHM201 Apply chemicals under supervision Release 1	Minor changes to Performance Criteria for clarity Updated Performance Evidence and Knowledge Evidence	Equivalent unit

Links

Companion Volumes, including Implementation Guides, are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

Assessment Requirements for AHCCHM201 Apply chemicals under supervision

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit. There must be evidence that the individual has on at least one occasion demonstrated that chemicals have been applied under supervision, ensuring they have:

- identified hazards and risks and adopted safe work practices and used appropriate personal protective equipment (PPE) according to supervisors' instructions
- confirmed activity with supervisor and identified and selected tools and equipment necessary for the application of chemical treatment
- carried out pre-operational checks of application equipment and made it ready for operation
- handled and transported chemicals to be used according to chemical labels and supervisors' instructions
- followed directions on chemical labels and relevant safety data sheets to safely mix and prepare chemicals
- selected appropriate measuring equipment and measured, mixed and loaded application equipment with chemicals safely and correctly
- ensured chemical spills were cleared according to chemical label instruction and supervisor instructions
- checked the application equipment for output against plan and applied chemical safely complying with weather conditions
- monitored and recorded weather and applied chemical appropriate to prevailing conditions
- maintained a healthy and safe condition for the environment and others while applying and following chemical application
- cleaned application equipment and PPE and disposed of waste according to equipment manufacturer instructions, chemical label and supervisor instructions
- complied with equipment manufacturer instructions, chemical label and supervisor instructions

- maintained chemical application records and incident reports according to workplace procedures
- stored protection equipment, application equipment and unused chemicals according to workplace procedures.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- various handling and transport techniques and requirements for chemicals
- structure and content of chemical labels and safety data sheets and their use and purpose for safe chemical application
- principles and methods of measuring, mixing and applying chemicals
- features and functions of a range of application equipment relevant to the workplace their operations, and maintenance requirements
- risk factors to be taken into account for human and animal health, spillage and environmental impact relevant to chemical use before, during and following chemical application
- basic chemical groupings and types used in the workplace, including:
  - the of mode of action
  - the impact on chemical safety
  - application methods
- paths of entry of poisons into the body and the methods of limiting exposure through practices and personal protective clothing
- maintenance practices for chemical application related equipment and PPE and disposal procedures for chemical contaminants and containers
- assessing weather conditions and the impact on safe application of chemicals
- components of a workplace chemical application plan
- chemical related records and reports and their purpose.

Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
  - skills must be demonstrated in a typical workplace environment or an environment that accurately represents workplace conditions
  - access to chemical store
- resources, equipment and materials:
  - common chemicals
  - PPE
  - chemical application equipment
  - chemical measuring and mixing equipment
- specifications:

- workplace documents, including work instructions and procedures
- chemical labels and safety data sheets
- chemical application plan and relevant chemical application rates
- manufacturers' operation and maintenance instructions for chemical measuring and application equipment

- relationships:
  - supervisor.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volumes, including Implementation Guides, are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

AHCMOM213 Operate and maintain chainsaws

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Application

This unit of competency describes the skills and knowledge required to safely operate a hand-held chainsaw and maintain it in working condition.

This unit applies to cross-cutting fallen timber using safe cutting techniques.

The unit applies to individuals who apply low risk work procedures and comply with worksite health and safety requirements when operating hand-held chainsaws to carry out routine work.

No occupational licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Unit Sector

Machinery operation and maintenance (MOM)

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Assist in preparation of work-site	1.1 Identify location of worksite and fallen timber from scope of works and confirm with supervisor 1.2 Identify site hazards, assess risks and report to supervisor

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	1.3 Confirm first aid and emergency personnel, equipment and procedures 1.4 Document and implement site health and safety in the workplace, environmental and traffic control measures according to workplace procedures
2. Recognise and apply workplace safety procedures	2.1 Identify hazards and risks relevant to the maintenance and operation of chainsaws and implement safe working practices to manage risks 2.2 Select, fit and use personal protective equipment according to workplace safety procedures 2.3 Confirm with supervisor relevant licensing and legislative requirements with regard to the operation of chainsaws 2.4 Transport chainsaw safely according to operation and maintenance manual
3. Check and prepare chainsaw for use	3.1 Select tools and materials required for maintenance 3.2 Conduct routine checks and maintenance prior to operation, according to chainsaw operation and maintenance manual 3.3 Calculate required fuel oil ratios prior to mixing 3.4 Mix fuel and fuel chainsaw according to operation and maintenance manual 3.5 Identify, tag, record and report chainsaw faults or malfunctions to supervisor
4. Operate chainsaw	4.1 Communicate with work team during operations using voice, hand or whistle signals 4.2 Place supports to ensure a stable base for cutting 4.3 Identify materials to be cut and position them for operation 4.4 Visually assess material to be cut for defects and embedded hazards 4.5 Determine cutting methods appropriate to material type and implement risk controls 4.6 Select and use tools associated with chainsaw use 4.7 Operate chainsaw to cross-cut timber using documented low risk work methods 4.8 Identify and report work-site communication issues to supervisor

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	4.9 Identify and report environmental impacts of chainsaw operation to supervisor
5. Complete and check chainsaw operation	5.1 Record and report chainsaw damage, malfunction and irregular performance according to workplace procedures 5.2 Clean and store chainsaw according to workplace procedures and operation and maintenance manual 5.3 Dispose of debris from operation in accordance with environmental requirements 5.4 Maintain workplace documentation according to workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	• Interpret textual information from a range of sources to identify relevant and key information about workplace operations
Writing	• Document site health and safety in the workplace, environmental and traffic control measures
Oral communication	• Use clear language to report hazards and risks and to confirm work site, first aid and emergency personnel, equipment and procedures • Participate in verbal exchanges to respond to questions and clarify information
Numeracy	• Calculate fuel oil ratios and fuel quantities
Navigate the world of work	• Recognise and follow workplace requirements, including safety requirements, associated with own role and area of responsibility
Interact with others	• Use verbal and non-verbal communications with work team during operations using voice, hand and whistle signals

Range of Conditions

This section specifies different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Personal protective equipment must include:	• safety helmet • mesh visor • gloves • hearing protection • safety glasses or goggles • safety boots.
Routine checks and maintenance must include at least two of the following:	• checking and adjusting bar • cleaning air filter • cleaning and/or replacing spark plug • sharpening chain.
Supports must include at least one of the following:	• fallen timber • saw horse trestle • v-shaped supports.
Cutting methods must include:	• pulling chains cuts (bottom of bar) • pushing chainsaw cuts (top of bar) • bore / plunge cuts (tip of bar).
Tools must include:	• bars • chains • files • plug spanner.

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
AHCMOM213 Operate and maintain chainsaws Release 2	AHCMOM213 Operate and maintain chainsaws Release 1	Minor changes to performance criteria and range of conditions	Equivalent unit

Links

Companion Volumes, including Implementation Guides are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

Assessment Requirements for AHCMOM213 Operate and maintain chainsaws

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit. There must be evidence that the individual has safely operated a hand-held chainsaw at least once, maintained it in working condition and demonstrated the following:

- determined site location for work and work details and clarified with supervisor
- identified site hazards, assessed risks and reported to supervisor
- confirmed work zone with work crew and monitored site
- confirmed first aid and emergency personnel, equipment and procedures
- applied hazard and risk assessment and implemented controls for chainsaw use
- performed routine checks and maintenance for chainsaw usage according to operation and maintenance manual
- identified, tagged and reported chainsaw faults and malfunctions
- recorded and implemented site health and safety in the workplace, environmental and traffic control measures
- used personal protective equipment that complies with Australian Standards
- safely cross-cut fallen timber using compression and tension cuts with a hand held chainsaw
- used appropriate tools and materials to maintain chainsaw
- applied environmentally responsible workplace practices
- applied low risk work practices including stopping, disengaging quickly and dealing with foreign matter
- cleaned and stored chainsaw
- followed workplace procedures relevant to safely operating a chainsaw.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- the principles and practice for operating chainsaws
- chainsaw routine checks and maintenance according to operation and maintenance manual, including:
  - checking and adjusting bar
  - cleaning air filter
  - cleaning and replacing spark plug
  - sharpening chain
- workplace safe operating procedures
- hazards and risks when operating a chainsaw
- relevant Australian Standards concerning chainsaw operation including use of personal protective equipment
- components of chainsaws and their respective functions
- common defects in woody materials
- cutting methods and techniques, patterns and sequence of cuts
- health and safety in the workplace requirements for the operation of a chainsaw including caution and hazard signs and symbols
- environmental impacts associated with operating chainsaws.

Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
  - a workplace setting or an environment that accurately represents workplace conditions
  - personal protective equipment must be worn whilst operating chainsaw
  - individual must not be under the influence of alcohol or drugs
  - individual must not be taking any medication (prescribed or otherwise) that may impair judgement
- resources, equipment and materials:
  - chainsaws
  - chainsaw tools
  - wood
  - safety equipment and personal protective equipment applicable to the task being undertaken
- specifications:
  - chainsaw manufacturer specifications and operator manuals
- timeframes:
  - according to the job requirements.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volumes, including Implementation Guides are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

AHCMOM304 Operate machinery and equipment

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Application

This unit of competency describes the skills and knowledge required to prepare and operate machinery and equipment in a safe and controlled manner that is used principally in agriculture, horticulture, and conservation and land management work.

This unit does not apply to chainsaws, tractors, vehicles or earth moving equipment.

The unit applies to individuals who operate machinery and equipment under broad direction, and take responsibility for their own work.

No occupational licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Unit Sector

Machinery operation and maintenance (MOM)

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare machinery and equipment for use	1.1 Confirm activity to be undertaken, including identifying potential hazards and risks and implementing safe working practices to manage risks

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	1.2 Source and interpret relevant machinery and equipment operation and maintenance manual and manufacturer instructions 1.3 Assess the work site and confirm the suitability of the machinery and equipment for the task 1.4 Select and maintain personnel protective equipment applicable to the machinery and equipment to be operated and the task to be undertaken 1.5 Fit and use personal protective equipment according to workplace procedures and job requirements 1.6 Conduct routine pre-operational checks as described in operation and maintenance manual 1.7 Replace and report damaged or worn components in line with workplace reporting requirements 1.8 Attach ancillary equipment and check for correct operation
2. Operate machinery and equipment	2.1 Operate machinery according to task requirements, conditions, operation and maintenance manual and manufacturer specifications 2.2 Monitor machinery performance and efficiency and make adjustments 2.3 Continually monitor hazards and risks, and ensure safety of self, other personnel, plant and equipment
3. Complete machinery and equipment operation	3.1 Conduct shut down of machinery according to workplace procedures 3.2 Perform routine operational servicing and minor maintenance according to operation and maintenance manual 3.3 Identify and report malfunctions, faults, irregular performance or damage according to workplace procedures 3.4 Clean, secure and store machinery and equipment according to workplace procedures 3.5 Maintain machinery and equipment use records in required format

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	• Interpret textual information from a range of sources to identify relevant and key information about workplace operations
Writing	• Document machinery and equipment use
Oral communication	• Use clear language to report malfunctions, faults, irregular performance or damage
Numeracy	• Calculate quantities of machinery fluids including oil and fuel
Navigate the world of work	• Recognise and follow workplace requirements, including safety requirements, associated with own role and area of responsibility

Range of Conditions

This section specifies different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Machinery and equipment must include at least one of the following:	• hydraulic equipment • stationary engines • spraying equipment • mulching and chipping equipment • powered trailers • three point linkage equipment.
Pre operational checks must include:	• machinery and equipment damage and serviceability • engine oil • fuel • machinery and equipment controls • reporting and tagging defects.

Unit Mapping Information

Code and title	Code and title	Comments	Equivalence status

current version	previous version		
AHCMOM304 Operate machinery and equipment Release 2	AHCMOM304 Operate machinery and equipment Release 1	Minor changes to performance criteria, foundation skills and range of conditions	Equivalent unit

Links

Companion Volumes, including Implementation Guides are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

Assessment Requirements for AHCMOM304 Operate machinery and equipment

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit. There must be evidence that the individual has operated agricultural or horticultural machinery and equipment at least once and has:

- identified and reported workplace hazards and implemented safe operating procedures
- carried out machinery and equipment pre-operational checks including basic servicing and maintenance according to operation and maintenance manual
- operated machinery and equipment in a safe and controlled manner consistent with task requirements, conditions, operation and maintenance manual and manufacturer specifications
- attached ancillary equipment and checked for correct operation
- carried out machinery shut down procedures
- recognised, reported and documented defects in equipment and machinery and operational capacity
- cleaned, secured and stored machinery and equipment.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- hazards and risks associated with machinery and equipment operation
- pre-operational and safety checks for machinery and equipment according to operation and maintenance manual
- operating principles and operating methods for machinery and equipment
- procedures for cleaning, securing and storing machinery, equipment and materials
- risks associated with the operation of machinery and equipment in different weather conditions and difficult terrain conditions

- duty of care to self, others and the environment
- workplace procedures applicable to health and safety in the workplace requirements for operating machinery and equipment.

Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
  - a workplace setting or an environment that accurately represents workplace conditions
  - individual must not be under the influence of alcohol or drugs
  - individual must not be taking any medication (prescribed or otherwise) that may impair judgement
  - individual must not be in a fatigued state when operating machinery and equipment
- resources, equipment and materials:
  - a range of machinery and equipment
  - enclosed toe shoes
  - safety equipment and personal protective equipment applicable to the machinery and equipment being used and the task being undertaken
- specifications:
  - machinery and equipment operation and maintenance manuals
  - industry and workplace biosecurity procedures applicable to machinery and equipment operation
  - records must include details of the machinery and equipment that the individual was assessed on
- timeframes:
  - according to the job requirements.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volumes, including Implementation Guides are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

AHCPCM204 Recognise plants

Modification History

Release	Comments
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 6.0.

Application

This unit of competency describes the skills and knowledge required to recognise commonly encountered plants, including desired species and weeds, and to document and confirm plant identification.

The unit applies to individuals who recognise plants under general supervision with limited autonomy or accountability.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Unit Sector

Plant Culture and Management (PCM)

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare for plant recognition	1.1 Confirm work activity and instructions with supervisor 1.2 Recognise workplace health and safety hazards, and report to supervisor 1.3 Select and prepare tools, equipment and material for plant recognition activity 1.4 Locate a range of desirable and non-desirable plants requiring

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	recognition
2. Recognise specified plants	2.1 Conduct a visual inspection on plants to identify plant family features and classifications 2.2 Record brief descriptions of plant habits, characteristics and significant features 2.3 Use available resources to assist with plant recognition 2.4 Seek advice to assist with plant recognition from appropriate personnel 2.5 Recognise and name specified plants using their identifiable characteristics
3. Identify plants	3.1 Record plant information according to workplace requirements 3.2 Confirm plant identification with supervisor, and refer to plant by botanical name

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	• Interpret textual, photographic and drawn information from a range of sources to identify relevant and key information about plant recognition
Writing	• Record plant habits, characteristics, significant features and relevant information
Oral communication	• Initiate discussions with appropriate personnel and supervisor, using clear language to discuss plant recognition

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status

Code and title current version	Code and title previous version	Comments	Equivalence status
AHCPCM204 Recognise plants	AHCPCM201 Recognise plants	Minor changes to application Major changes to performance criteria Foundation skills added Assessment requirements updated	Not equivalent

Links

Companion Volumes, including Implementation Guides, are available at VETNet: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

Assessment Requirements for AHCPCM204 Recognise plants

Modification History

Release	Comments
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 6.0.

Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit.

There must be evidence that the individual has recognised a range of plants from a range of plant families and classifications, including:

- annual
- biennial
- perennial
- evergreen and deciduous
- trees
- shrubs
- ground cover
- climbers
- monocot.

There must also be evidence that the individual has:

- applied workplace health and safety requirements applicable to recognising plants
- selected and prepared tools, equipment and materials for use in recognition activity
- located desirable and non-desirable plants requiring recognition
- recognised and described plant habits, characteristics and significant features
- used appropriate reference material to assist with plant recognition
- recorded information about identified plants.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- workplace requirements applicable to health and safety in the workplace for recognising plants
- principles and practices of plant recognition, including:
  - plant morphology and physiology as they relate to recognising plants

- plant nomenclature
- resources for obtaining information about plants
- plant recognition techniques.

Assessment Conditions

Assessment of the skills in this unit of competency must take place under the following conditions:

- physical conditions:
  - a workplace setting or an environment that accurately represents workplace conditions
- resources, equipment and materials:
  - plants
  - plant recognition resources and equipment
  - access to internet and field guide reference materials applicable to plant recognition
- specifications:
  - workplace requirements applicable to health and safety in the workplace for recognising plants
- relationships:
  - appropriate personnel and supervisor
- timeframes:
  - according to job requirements.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volumes, including Implementation Guides, are available at VETNet: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

AHCPCM205 Fell small trees

Modification History

Release	Comments
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 6.0.

Application

This unit of competency describes the skills and knowledge required to prepare for tree felling, fell small trees and complete felling operations where hazards have been assessed as low risk.

The unit applies to individuals who apply low risk work procedures and comply with worksite health and safety requirements when felling trees under general supervision, with limited autonomy or accountability.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

The prerequisite unit of competency for this unit is:

- AHCMOM213 Operate and maintain chainsaws.

Unit Sector

Plant Culture and Management (PCM)

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Assist in preparation of worksite	1.1 Identify location of worksite and correct tree from scope of works, and confirm with supervisor 1.2 Identify site hazards, assess risks and report to supervisor 1.3 Confirm work zone with work crew, and monitor site

Elements	**Performance Criteria**
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	1.4 Confirm first aid and emergency personnel, equipment and procedures 1.5 Document and implement site health and safety in the workplace, environmental and traffic control measures according to workplace procedures
2. Identify tree felling requirements	2.1 Identify hazards and risks relevant to felling operation, and implement safe working practices to manage risks 2.2 Examine topography and site conditions 2.3 Identify factors influencing the tree felling operation, and confirm with supervisor 2.4 Identify trees considered outside own skill level for felling, and seek assistance from appropriate personnel 2.5 Determine natural direction of fall, safe fall zone and exclusion zone, and confirm with supervisor 2.6 Confirm tree felling operations and instructions with supervisor prior to undertaking work
3. Prepare for tree felling	3.1 Select and prepare felling equipment and component options appropriate to the task being undertaken 3.2 Prepare, transport and position support tools to minimise felling delays 3.3 Select and maintain safety and personal protective equipment (PPE) according to workplace health and safety requirements 3.4 Fit and use safety equipment and PPE applicable to the task being undertaken 3.5 Clear fall zone of obstacles and articles that may be damaged by felled tree 3.6 Establish clear escape route appropriate to site
4. Fell tree	4.1 Note and monitor location of other personnel 4.2 Carry out tree felling operation according to scope of works 4.3 Communicate with work team during operations using voice, hand or whistle signals 4.4 Determine standard tree felling techniques, patterns and cut sequences by ground conditions and state of canopy 4.5 Take corrective action in response to changing conditions or

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	problems encountered 4.6 Use planned escape route when tree starts to fall 4.7 Monitor fall of tree and movement on ground until felled tree is stable 4.8 Undertake tree felling activities using documented low risk work methods
5. Complete tree felling operation	5.1 Determine appropriate method of clearing the site of felled tree 5.2 Select and use machinery required for removal of felled tree 5.3 Clear fall site of tree and all tree debris according to supervisor instructions 5.4 Clean and return machinery, tools and equipment to required location 5.5 Identify and report unserviceable machinery, tools and equipment according to workplace procedures 5.6 Report tree felling activities according to workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	• Interpret textual information from a range of sources to identify relevant and key information about tree felling operations
Oral communication	• Use clear language to report hazards and risks and to confirm worksite, first aid and emergency personnel, equipment and procedures, and to report felling activities and unserviceable machinery, tools and equipment • Participate in verbal exchanges to respond to questions and clarify information • Use verbal and non-verbal communications with work team during operations using voice, hand and whistle signals

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
AHCPCM205 Fell small trees	AHCPCM203 Fell small trees	Minor changes to application Major changes to performance criteria Foundation skills added Assessment requirements updated	Not equivalent

Links

Companion Volumes, including Implementation Guides, are available at VETNet: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

Assessment Requirements for AHCPCM205 Fell small trees

Modification History

Release	Comments
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 6.0.

Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit.

There must be evidence that the individual has felled small trees on at least three occasions, and has:

- applied workplace health and safety requirements applicable to felling small trees
- applied principles and practices of small tree felling operations
- applied documented low risk work methods and workplace procedures
- assessed topography and site conditions, identified factors influencing tree felling operation, and confirmed findings with supervisor
- prepared, transported and positioned support tools to minimise felling delays
- safely operated a chainsaw to fell small trees
- reported felling activities, and machinery, tool and equipment unserviceability according to workplace procedures.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- workplace requirements applicable to health and safety in the workplace for small tree felling operations
- principles and practices of small tree felling operations, including:
  - corrective action
  - emergency and first aid procedures
  - felling equipment and components
  - first aid and emergency personnel, equipment and procedures
  - ground conditions
  - how to determine natural direction of fall
  - how to establish a clear escape route
  - industry standard terminology

- obstacles and articles that may be damaged by felled trees
- positioning support tools
- safe operating procedures for felling small trees
- safe fall and exclusion zones
- selection, preparation and appropriate equipment for task
- standard tree felling techniques, patterns and cut sequences
- topography, site conditions and other factors influencing tree felling operations
- low risk work methods and workplace procedures for small tree felling operations.

Assessment Conditions

Assessment of the skills in this unit of competency must take place under the following conditions:

- physical conditions:
  - a workplace setting or an environment that accurately represents workplace conditions
  - personal protective equipment (PPE) must be worn whilst operating chainsaw
  - individual must not be under the influence of alcohol or drugs
  - individual must not be taking any medication (prescribed or otherwise) that may impair judgement
- resources, equipment and materials:
  - chainsaws
  - chainsaw tools
  - small trees
  - tree felling machinery, tools and equipment
  - safety equipment and PPE applicable to the task being undertaken
- specifications:
  - workplace requirements applicable to health and safety in the workplace and small tree felling operations
  - documented low risk work methods and workplace procedures applicable to small tree felling operations
- relationships:
  - team members, supervisor
- timeframes:
  - according to job requirements.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volumes, including Implementation Guides, are available at VETNet: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

AVIW0006 Perform infrastructure inspections using remote operated systems

Modification History

Release 1. This is the first release of this unit of competency in the AVI Aviation Training Package.

Application

This unit involves the skills and knowledge required to operate and manage remote pilot aircraft systems (RPAS) when inspecting infrastructure in compliance with relevant regulatory requirements of the Civil Aviation Safety Authority (CASA) and national operating standards.

Infrastructure includes but is not limited to electricity pylons, gas pipelines, cables, roads and rail infrastructure.

It includes operating and managing RPAS during normal flight, and managing RPAS during abnormal and emergency procedures.

This unit addresses aviation technical skill requirements (physical, mental and task-management abilities) related to equipment and system operations of flight or ground operations personnel and contributes to safe and effective performance in complex aviation operational environments.

Operations are conducted as part of commercial and military aircraft activities across a variety of operational contexts within the Australian aviation industry.

Work is performed independently or under limited supervision within a single-pilot or multi-crew RPAS environment.

Licensing, legislative, regulatory or certification requirements are applicable to this unit.

Pre-requisite Unit

Not applicable.

Competency Field

W – Equipment and Systems Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Conduct pre-flight actions	**1.1** Own fitness for flight and planned operations is self-assessed
	1.2 Operational aircraft type is determined for suitability for type of aerial infrastructure inspection operation
	1.3 Aircraft and role equipment are checked and assessed for serviceability prior to commencing flight operations
	1.4 Required applicable maintenance documentation is compiled and checked for accuracy and completeness
	1.5 Role equipment calibration is checked and adjusted as required
	1.6 Planned aerial infrastructure inspection operations are assessed for potential or actual hazards
	1.7 Fuel/power requirements are determined and established within aerial operational plans
	1.8 Issues relating to aircraft weight, performance, dimensions, load and meteorological conditions are identified and managed
2 Conduct planning and risk management	**2.1** Suitability of current and forecast weather is determined
	2.2 Infrastructure inspection plan is developed and used as the basis for aerial application operations
	2.3 Potential and actual hazards and operational requirements are identified, risks to aerial infrastructure inspection operations are assessed and appropriate risk controls implemented in accordance with the application management plan
	2.4 Area map is correctly interpreted
	2.5 Acceptable aircraft performance for aerial infrastructure inspection operational conditions is confirmed through performance planning

	2.6	Normal and abnormal operational communications and signals are confirmed
3 Conduct aerial mapping and modelling	**3.1**	Appropriate aerial survey plans are developed for conducting safe aerial mapping and modelling operations
	3.2	Operating area boundaries are established and environmentally sensitive areas identified, including areas that are noise sensitive, biologically susceptible, populated and urban, and restricted or dangerous
	3.3	Potential emergency or alternate landing areas are identified and/or established for contingency operations
	3.4	Environmental hazard factors affecting aerial mapping and modelling operations are considered
	3.5	Wind velocity and direction are assessed for effect on operations
	3.6	Infrastructure inspection operations is conducted safely in accordance with the application management plan
	3.7	Infrastructure inspection equipment is operated within scope of the plan
	3.8	Decisions to suspend or continue safe aerial infrastructure inspection are taken based on planned or actual operating conditions
	3.9	Power lines within and outside the treatment area during an aerial survey are identified and accurately assessed to support safe operations in vicinity of power lines, including safe flying parallel to wires
4 Perform infrastructure inspections	**4.1**	Infrastructure and condition assessment criteria are verified and understood prior to the inspection
	4.2	Data capture process is selected based on the type of infrastructure
	4.3	Various types of structural failures are recognised and recorded
	4.4	Infrastructure data and records are provided in accordance with client requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Unit Mapping Information

No equivalent unit.

Links

AVI Training Package Companion Volume Implementation Guide available on VET Net: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=4725260a-0af3-4daf-912b-ef1c2f3e5816

Assessment Requirements for AVIW0006 Perform infrastructure inspections using remote operated systems

Modification History

Release 1. This is the first release of this unit of competency in the AVI Aviation Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- adapting to differences in equipment and operating environment in accordance with standard operating procedures (SOPs)
- applying precautions and required action to minimise, control or eliminate identified hazards
- applying relevant legislation and workplace procedures
- communicating effectively with others
- completing relevant documentation
- identifying and correctly using relevant equipment
- implementing contingency plans
- implementing work health and safety (WHS) procedures and relevant regulations
- interpreting and following operational instructions and prioritising work
- interpreting remote pilot aircraft systems (RPAS) displays
- modifying activities depending on workplace contingencies, situations and environments
- monitoring and anticipating operational problems and hazards and taking appropriate action
- monitoring work activities in terms of planned schedule
- operating electronic communications equipment to required protocol
- performing systematic scan technique for monitoring RPAS, sub-systems (equipment) and devices
- reading, interpreting and following relevant regulations, instructions, procedures, information and signs
- reporting and/or rectifying problems, faults or malfunctions promptly in accordance with workplace procedures
- selecting and using required personal protective equipment (PPE) conforming to industry and WHS standards
- undertaking fault finding in RPAS
- using automated systems to manage workload
- working collaboratively with others
- working systematically with required attention to detail without injury to self or others, or damage to goods or equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- aeronautical decision-making processes relevant to RPAS operations
- effective communication
- error management, including error types, causes and consequences
- fatigue risk management
- human factors relevant to RPAS operations
- human performance and its limitations, including the senses, memory and situational awareness
- normal, minimum and maximum fuel pressures or battery/power levels and power draw
- risk identification, analysis and control
- RPAS as applicable to rating/endorsement requirements, including:
  - battery/fuel/power system:
    - use of a schematic diagram of battery/fuel/power system to explain layout and normal operating procedures
    - likely faults that may affect battery/fuel/power system
    - emergency operating procedures for battery/fuel/power system
    - operation of /battery/fuel/power selector panel or display
    - use of cross-feed or power distribution
    - full battery/fuel capacity and fuel grade
  - flight environment information, including :
    - head-up display (HUD) suitable for flight
    - RPAS control systems suitable for flight indications, including height, speed, direction and location
  - electrical system, including:
    - use of a schematic diagram of electrical system to explain type/s of electrical system
    - structural failures
    - likely faults that may affect electrical system
    - emergency operating procedures for electrical system
    - voltage and amperage of battery or power cell
    - number and output of generators
    - methods of circuit protection
    - location of fuses and circuit breakers
    - precautions to be taken when operating electrical devices
    - instruments and displays operated by electrics
  - detection and avoidance systems, including:
    - surveillance and collision avoidance functions of detection and avoidance systems
    - system limitations, selectivity and inhibits

    - basic components of detection and avoidance systems
    - identification and demonstration of controls or explanation of function of RPAS control station
    - detection and avoidance systems visual displays and symbology
    - functions of audio alerts and annunciations
    - appropriate crew response to multiple detection and avoidance systems events
    - recall of radiotelephone procedures following a detection and avoidance system alert
    - requirements for a written report of a detection and avoidance systems alert and to whom it must be submitted
  - automated systems, including:
    - limitations of automated systems
    - operating procedures for systems, such as flight management system, auto throttle/engine/thrust control, flight director system, automated aircraft navigation systems, and automated engine condition and monitoring system
    - workload management procedures for utilising automated systems
    - warning systems/indicators to identify automated systems failure
  - RPAS checklists, including:
    - explanation of the normal system operating procedures of RPAS, sub-systems and devices used to operate specific RPAS, including use of published scans and checklists, immediate action items, warnings and limitations
- stress, workload and time pressure management.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations. Where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- acceptable means of simulation assessment
- applicable documentation, including workplace procedures, regulations, codes of practice and operation manuals
- relevant materials, tools, equipment and PPE currently used in industry.

Links

AVI Training Package Companion Volume Implementation Guide available on VET Net: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=4725260a-0af3-4daf-912b-ef1c2f3e5816

BSBFIN501 Manage budgets and financial plans

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to undertake financial management in an organisation or work area. It includes planning and implementing financial management approaches and supporting and evaluating effectiveness of financial management processes.

The unit applies to managers in a wide range of organisations and sectors who have responsibility for the effective use of financial resources within work teams. They are responsible for ensuring that financial resources are managed in line with the financial objectives of the team and organisation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Business Competence – Financial Literacy

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Plan financial management approaches	1.1 Access budget and financial plans for work team 1.2 Evaluate budget and financial plan outcomes with required organisational personnel 1.3 Negotiate any changes required to be made to budget and financial plans with required organisational personnel 1.4 Prepare contingency plans in the event that initial plans need to be varied
2. Implement and monitor financial	2.1 Communicate details of agreed budget and financial plans to relevant team members

ELEMENT	PERFORMANCE CRITERIA
management plans	2.2 Support team members to access resources and systems to perform required roles 2.3 Implement processes to monitor actual expenditure, control costs and modify contingency plans as required according to financial objectives 2.4 Report on budget and expenditure according to organisational protocols
3. Review and evaluate financial management plans	3.1 Collect information on effectiveness of financial management processes within work team 3.2 Analyse variance between actual and budgeted finances 3.3 Identify and recommend improvements to existing financial management processes 3.4 Implement agreed improvements according to financial objectives of work team and organisation 3.5 Evaluate agreed improvements

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Numeracy	• Uses a wide range of mathematical calculations to analyse numeric information in budgets or financial plans
Oral communication	• Presents information about financial issues and requirements to a range of audiences using structure and language to suit audience • Uses active listening and questioning to clarify information and to confirm understanding
Reading	• Interprets and analyses information to determine activities required
Writing	• Records information in correct forms and prepares materials which convey detailed and factual content according to internal procedures
Teamwork	• Uses a range of strategies to connect, collaborate and cooperate with other work colleagues in activities requiring collective effort and diverse skills and knowledge
Initiative and enterprise	• Applies organisational requirements in undertaking own work
Planning and organising	• Uses logical processes in planning, implementing and evaluating complex tasks and developing alternative strategies to achieve goals

SKILL	DESCRIPTION
	and timelines
Technology	• Uses a range of digital technologies to access, filter, compile, integrate and logically present complex information from multiple sources

Unit Mapping Information

Supersedes and is equivalent to BSBFIM501 Manage budgets and financial plans.

Supersedes but is not equivalent to BSBGOV403 Analyse financial reports and budgets.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBFIN501 Manage budgets and financial plans

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- manage the budget and financial plan of an organisation for one reporting period.

In the course of the above, the candidate must:

- communicate with relevant people to clarify budget and financial plans, negotiate changes and disseminate information
- prepare, implement and modify financial contingency plans
- monitor expenditure and control costs
- support and monitor team members
- report on budget and expenditure
- review and make recommendations for improvements to financial processes
- meet record-keeping requirements for Australian Taxation Office (ATO) and for auditing purposes.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- basic accounting principles
- types of budgets and financial plans
- legislation and current ATO requirements, including the Goods and Services Tax (GST)
- key requirements for financial record keeping and auditing
- principles for managing work teams
- principles and techniques involved in managing:
  - budgeting
  - cash flows
  - electronic spreadsheets

- Goods and Services Tax
- ledgers and financial statements
- profit and loss statements
- evaluation of budget and financial plans.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- workplace policies and procedures
- workplace budgets and financial plans.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBHRM523 Coordinate the learning and development of teams and individuals

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to coordinate the learning and development of teams and individuals. Particular emphasis is on the coordination of strategies to facilitate and promote learning and to monitor and improve learning performance.

The unit applies to individuals who have a role in coordinating the development of a learning environment in which work and learning come together. At this level work will normally be carried out within complex and diverse methods and procedures, which require the exercise of considerable discretion and judgement, using a range of problem solving and decision-making strategies.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Technical Skills – Human Resources

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Coordinate creation of learning opportunities	1.1 Identify potential formal and informal learning opportunities 1.2 Identify learning requirements of teams and individuals according to requirements of organisation and available learning opportunities 1.3 Coordinate implementation of learning plans and ensure that learning plans reflect diversity of needs 1.4 Review relevant organisational procedures and ensure they

ELEMENT	PERFORMANCE CRITERIA
	support individual and team access to learning opportunities, where required 1.5 Consult with training and development specialists and use their advice to contribute to learning opportunities
2. Coordinate learning	2.1 Coordinate strategies to ensure workplace learning opportunities are used by teams and individuals 2.2 Coordinate implementation of policies and procedures to encourage team members to assess their own competencies and identify their own learning and development needs 2.3 Communicate benefits of learning with others in the team and organisation 2.4 Recognise workplace achievement by relevant recognition, feedback and rewards
3. Monitor and improve learning effectiveness	3.1 Monitor team and individual learning performance to determine type and extent of any additional work-based support required 3.2 Use feedback from individuals and teams to identify and recommend improvements in future learning arrangements 3.3 Suggest adjustments, negotiated with training and development specialists, for improvements to learning 3.4 Record and report learning and development of teams and individuals

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Reading	• Interprets textual information obtained from a range of sources and determines how content may be applied to individuals and to organisational requirements
Writing	• Uses information from a range of sources to develop and document plans, strategies and feedback according to organisational requirements • Maintains records using correct technical and organisational vocabulary
Oral Communication	• Present information and opinions using language and features appropriate to the audience and context • Uses questioning and listening techniques to identify learning needs and obtain feedback
Initiative and	• Recognises and responds to both explicit and implicit organisational procedures and protocols and legislative and regulatory requirements

SKILL	DESCRIPTION
enterprise	• Understands how own role meshes with others and contributes to broader goals
Teamwork	• Selects the appropriate form, channel and mode of communication for a specific purpose relevant to own role • Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction, influencing direction and taking a leadership role on occasion • Recognises the importance of building rapport to establish effective working relationships • Applies a range of communication strategies to encourage others to share their knowledge and skills and reflect on the effectiveness of the interaction
Problem solving	• Uses logical processes to plan, implement and monitor learning in the workplace • Systematically gathers and analyses relevant information and evaluates options to make informed decisions
Technology	• Uses digital tools to organise, store, integrate and share relevant information

Unit Mapping Information

No equivalent unit. Supersedes but is not equivalent to BSBLED501 Develop a workplace learning environment.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBHRM523 Coordinate the learning and development of teams and individuals

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- coordinate learning and development for at least one team and for at least one individual.

In the course of the above, the candidate must:

- liaise with training and development specialists
- recognise workplace achievement by giving feedback, recognition and rewards
- monitor and recommend improvements for workplace learning
- record and report workplace learning outcomes.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- how management of relationships can achieve a learning environment
- principles and techniques involved in the management and organisation of:
  - adult learning
  - coaching and mentoring
  - consultation and communication
  - improvement strategies
  - leadership
  - learning environment and learning culture
  - monitoring and reviewing workplace learning
  - problem identification and resolution
  - record keeping and management methods
  - structured learning
  - work-based learning.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- relevant organisational policies and procedures
- workplace equipment and resources relevant to performance evidence.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBINS402 Coordinate workplace information systems

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to implement and review workplace information systems. It involves identification, collection, initial analysis and use of information.

The applies to individuals whose work will normally be carried out within methods and procedures which require planning and evaluation, leadership and guidance of others, and some discretion and judgement.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Technical Skills – Information Services

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Identify and review information needs	1.1 Identify information required by relevant stakeholders 1.2 Review information requirements to determine suitability, accessibility, currency and reliability of information according to organisational policies and procedures
2. Collect, analyse and report information	2.1 Collect information which is adequate and relevant to the requirements of relevant stakeholders 2.2 Confirm information is in a format suitable for analysis, interpretation and distribution 2.3 Analyse information, identify and report relevant trends according to the requirements for which it was collected

ELEMENT	PERFORMANCE CRITERIA
3. Implement information systems	3.1 Implement information systems effectively to store, retrieve and regularly review information for decision making purposes 3.2 Use technology available in the work area to manage information effectively 3.3 Recommend improvements to information system to relevant stakeholders
4. Support information system continuous improvement	4.1 Collect data about information system future needs in consultation with relevant stakeholders 4.2 Confirm identified information system future needs reflect the organisation's business plans 4.3 Assist development of proposals for continuous improvement of information system 4.4 Distribute information to relevant stakeholders on information system changes, where required

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

Skill	Description
Reading	• Critically analyses documentation from a variety of sources and consolidates information
Writing	• Develops information for a specific audience using clear and detailed language
Oral Communication	• Uses active listening and questioning to convey and clarify information and to confirm understanding
Numeracy	• Selects from and uses mathematical strategies to perform initial analysis on information
Planning and organising	• Takes responsibility for planning, sequencing and prioritising tasks and own workload for efficiency and effective outcomes
Teamwork	• Cooperates with others and contributes to work practices where joint outcomes are expected and deadlines are to be met
Problem solving	• Contributes to continuous improvement of current work practices by applying basic principles of analytical thinking
Technology	• Uses digital technologies and systems to access, enter, present and distribute information

Unit Mapping Information

Supersedes and is equivalent to BSBINM401 Implement workplace information system.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBINS402 Coordinate workplace information systems

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- distribute information to relevant stakeholders in response to three different workplace information needs
- implement and review a workplace information system on at least one occasion.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- key aspects of workplace information systems including:
  - budgets and financial management systems
  - customer information software or records
  - databases
  - product and service information
  - project management software
  - record management systems
  - spreadsheets.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- a workplace information system
- organisational policies and procedures.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBINS501 Implement information and knowledge management systems

Modification History

Release	Comments
Release 2	This version first released with the Business Services Training Package Version 8.0. Typographical error in Foundation Skills corrected.
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to organise training for an information and knowledge management system and to implement the use of the system.

The unit applies to individuals who are responsible for ensuring relevant information and corporate knowledge are retained, accessible and improve business outcomes.

It applies to information and knowledge management systems that comprise policies, protocols, procedures and practices to manage information or knowledge within the organisation and among relevant stakeholders.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Technical Skills – Information Services

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Implement use of management system	1.1 Identify legislative requirements, and organisational policies and procedures

ELEMENT	PERFORMANCE CRITERIA
	1.2 Implement information and knowledge management system according to legislative requirements and organisational policies and procedures 1.3 Address implementation issues and problems, where required 1.4 Collect information on relevant key performance indicators 1.5 Identify contingencies and refer technical specialist help, where required
2. Organise learning to use management systems	2.1 Identify learning requirements of relevant stakeholders for use of an information and knowledge management system 2.2 Identify and secure resources required for learning activities to use an information and knowledge management system 2.3 Organise and facilitate learning activities 2.4 Promote and support use of the system throughout the organisation 2.5 Monitor and document effectiveness of learning activities
3. Review use of management system	3.1 Analyse effectiveness of system and report on strengths and limitations of the system 3.2 Recommend improvements to information and knowledge management system, where required

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

Skill	Description
Writing	• Prepares and produces documentation for a specific audience using clear and detailed language to convey explicit information, requirements and recommendations
Oral Communication	• Presents information using structure and language to suit the audience • Uses active listening and questioning and reading of verbal and non-verbal signals to clarify information and to confirm understanding
Self-management	• Takes responsibility for following policies, procedures and legislative requirements and identifies organisational implications of new legislation or regulation
Teamwork	• Collaborates with others, sharing information to build strong work groups and avoid behaviours that are not conducive to a productive environment • Elicits feedback and provides feedback to others in order to improve

Skill	Description
	self or workgroup behaviours
Planning and organising	• Accepts responsibility for planning and sequencing complex tasks and workload, negotiating key aspects with others and taking into account capabilities, efficiencies and effectiveness • Monitors progress of plans and schedules and reviews and changes them to meet new demands and priorities
Problem solving	• Applies systematic and analytical processes to address problems and make decisions in complex situations
Initiative and enterprise	• Investigates new and innovative ideas to continuously improve, work practices and processes
Technology	• Uses and investigates new digital technologies and applications to manage and manipulate data and communicate effectively with others

Unit Mapping Information

Supersedes and is equivalent to BSBINM501 Manage an information or knowledge management system.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBINS501 Implement information and knowledge management systems

Modification History

Release	Comments
Release 2	This version first released with the Business Services Training Package Version 8.0. Typographical error in Foundation Skills corrected.
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- implement and review one information management system
- implement and review one knowledge management system
- facilitate learning on both these information and knowledge management systems.

In the course of the above, the candidate must:

- identify learning needs and plan and implement learning activities to enable personnel to use information and knowledge management system
- monitor performance and address issues and contingencies as they arise including:
  - accessing technical specialists, as required
  - applying correct policies and procedures for the information or knowledge management system
  - evaluating effectiveness of information or knowledge management system for intended outcomes
- recommend improvements to systems, policies and practices, where required.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- relevant legislation, regulation, standards and codes
- organisational policies and procedures, including those related to:
  - information management
  - knowledge management

- organisational operations and existing data and information systems
- relevant learning activities and key performance indicators.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- legislation, regulation, standards and codes relevant to information and knowledge management
- workplace systems, documentation and resources relevant to performance evidence.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBLDR413 Lead effective workplace relationships

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills, knowledge and outcomes required to use leadership to promote team cohesion. It includes motivating, mentoring, coaching and developing the team and forming the bridge between the management of the organisation and team members.

The unit applies to team leaders, supervisors and new or emerging managers where leadership plays a role in developing and maintaining effective workplace relationships. It applies in any industry or community context. At this level work will normally be carried out within routine and non-routine methods and procedures, which require planning, evaluation, leadership and guidance of others.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Social Competence – Leadership

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare to lead workplace relationships	1.1 Identify work team objectives according to organisational strategy 1.2 Collect and analyse information for the achievement of work task 1.3 Share ideas and information with relevant internal and external stakeholders according to work task 1.4 Develop strategy for completion of work task in collaboration with work team

ELEMENT	PERFORMANCE CRITERIA
2. Lead workplace relationships	2.1 Identify and implement methods to facilitate collaboration to complete work task 2.2 Support colleagues experiencing difficulties fulfilling work requirements 2.3 Manage conflict constructively within the organisation's processes and parameters of own role 2.4 Communicate work progress to relevant internal and external stakeholders
3. Review leadership	3.1 Seek feedback on relationship management for work task from relevant stakeholders 3.2 Analyse feedback on relationship management 3.3 Evaluate personal performance in leading workplace relationships 3.4 Identify areas of improvement for leading workplace relationships future work tasks

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

SKILL	DESCRIPTION
Reading	• Collects, analyses and evaluates textual information from a range of resources to inform improvement strategies
Oral Communication	• Selects or adjusts communication style to maintain effectiveness of interaction and build and maintain engagement consistent with organisational requirements
Initiative and enterprise	• Identifies and follows legislative and organisational requirements relevant to own role
Teamwork	• Selects and uses appropriate conventions and protocols when communicating with diverse stakeholders • Adapts personal communication style to build trust and positive working relationships and to show respect for the opinions, values and particular needs of others • Plays a lead role in situations requiring effective collaboration, demonstrating conflict resolution skills and ability to engage and motivate others
Planning and	• Plans and implements activities and processes to manage and review work performance

organising	• Systematically gathers and analyses all relevant information to formulate and evaluate possible solutions to difficulties

Unit Mapping Information

Supersedes and is equivalent to BSBLDR402 Lead effective workplace relationships.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBLDR413 Lead effective workplace relationships

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- lead effective workplace relationships on at least four occasions with different individuals or groups.

In the course of the above, the candidate must:

- access and analyse information required to achieve planned outcomes
- collaborate with work team to develop and implement a work task strategy
- apply techniques for resolving problems and conflicts, and dealing with poor performance according to organisational and legislative requirements
- monitor and communicate work progress to relevant internal and external stakeholders
- seek and review feedback to improve workplace leadership.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- considerations for communicating information including audience cultural and social diversity
- consultation processes including internal and external sources of consultees
- impacts of relationships, cultural and social environment, in supporting or hindering the achievement of planned outcomes
- techniques for developing positive work relationships and building trust and confidence in a team, including:
  - interpersonal styles
  - communications
  - consultation
  - cultural and social sensitivity
  - networking

- impact of legislation and organisational policies on workplace relationships
- techniques for communicating information and ideas to a range of stakeholders
- common methods to resolve workplace conflict
- common methods to manage poor work performance
- common methods to monitor, analyse and improve work relationships.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- legislation, regulations, standards and codes relevant to performance evidence
- workplace documentation and resources
- interaction with others.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBLDR414 Lead team effectiveness

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills, knowledge and outcomes required to lead the performance of a team and to develop team cohesion.

The unit applies team leaders, supervisors and new emerging managers who have an important leadership role in the development of efficient and effective work teams. Leaders at this level also provide leadership for the team and bridge the gap between the management of the organisation and the team members. As such they must 'manage up' as well as manage their team/s.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Social Competence – Leadership

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Plan team outcomes	1.1 Lead team to identify and establish team objectives and work processes 1.2 Support team to document identified objectives and work processes according to organisational processes 1.3 Encourage team members to incorporate innovation and productivity measures in work plans 1.4 Lead and support team members to meet expected outcomes
2. Promote team cohesion	2.1 Provide opportunities for input of team members into planning, decision making and operational aspects of work team

ELEMENT	PERFORMANCE CRITERIA
	2.2 Support team members to take responsibility for own work and to assist each other in undertaking required roles and responsibilities 2.3 Provide feedback to team members on their efforts and contributions 2.4 Address or refer issues, concerns and problems identified by team members 2.5 Model expected behaviours and approaches
3. Supervise team performance	3.1 Encourage team members to participate in and take responsibility for team activities and communication processes 3.2 Support team to identify and resolve problems which impede performance 3.3 Ensure own contribution to work team serves as a role model for others
4. Liaise with management	4.1 Establish open communication with line management 4.2 Communicate information from line management to the team 4.3 Communicate unresolved issues, concerns and problems raised by the team to line management to action 4.4 Communicate issues raised by management to the team to action

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

SKILL	DESCRIPTION
Writing	• Prepares workplace plans that communicate intent and elicits feedback clearly and effectively
Oral communication	• Engages in discussions or provides information using structure and language appropriate to the audience and situation
Teamwork	• Selects and uses appropriate conventions and protocols when communicating with team members • Adapts personal communication style to model required behaviours, build trust and positive working relationships and to show respect for the opinions and values of others • Plays a lead role in situations requiring effective collaboration, demonstrating conflict resolution skills and ability to engage and motivate others

Planning and organising	• Develops, implements and monitors plans and processes to ensure team engagement and effectiveness • Uses formal analytical thinking techniques to identify issues and generate possible solutions, seeking input from others, as required

Unit Mapping Information

Supersedes and is equivalent to BSBLDR403 Lead team effectiveness.

Supersedes but is not equivalent to BSBSMB407 Manage a small team.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBLDR414 Lead team effectiveness

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- develop a team development plan, that addresses:
  - innovation and productivity measures
  - team cohesion
  - issues management and actions.

In the course of the above, the candidate must:

- apply knowledge of organisational goals, objectives and plans to work tasks
- communicate with team members and management to identify and establish team purpose, roles, responsibilities, goals plans and objectives and resolve problems
- consult, encourage, support and provide feedback to team members
- model team leadership behaviours and approaches.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- work processes, including team purpose, roles, responsibilities, goals and plans
- organisational escalation policies and procedures
- behaviours which enhance organisational image for work team, clients and customers
- processes for setting goals that contribute to team effectiveness
- effects of individual behaviour on team effectiveness
- innovation and productivity measures in work plans
- key features of common leadership styles.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- information about the organisation, including organisational structure, goals, objectives and plans.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBLDR522 Manage people performance

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.
Release 2	This version first released with BSB Business Services Training Package Version 7.1. Release created to amend typographical error with performance criteria.

Application

This unit describes the skills and knowledge required to manage the performance of staff that are direct reports.

The unit applies to individuals who manage people. It covers work allocation and the methods to review performance, reward excellence and provide feedback. The unit makes the link between performance management and performance development and reinforces both functions as a key requirement for effective managers.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Social Competence – Leadership

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Allocate work	1.1 Consult relevant groups and individuals on work to be allocated and resources available 1.2 Develop work plans and allocate work according to organisational requirements and operational plans 1.3 Develop and confirm performance standards and key

ELEMENT	PERFORMANCE CRITERIA
	performance indicators with relevant staff 1.4 Conduct risk analysis according to organisational risk management plan and legal requirements
2. Assess performance	2.1 Review performance management and processes according to legislation, organisational objectives and policies 2.2 Train participants in the performance management and review process 2.3 Conduct performance management according to organisational policies procedures and relevant timelines 2.4 Monitor and evaluate performance according to performance standards and key performance indicators
3. Provide feedback	3.1 Provide informal feedback and coaching to staff 3.2 Advise relevant personnel, where performance is poor and take necessary actions 3.3 Document feedback according to the organisational performance management system 3.4 Conduct formal structured feedback sessions as necessary and according to organisational policy
4. Manage follow up	4.1 Develop performance improvement and development plans according to organisational policies 4.2 Monitor underperforming individuals according to organisational policies 4.3 Respond to underperforming individuals, as required 4.4 Reinforce excellence in performance through recognition and continuous feedback

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

SKILL	DESCRIPTION
Learning	• Consolidates and improves own knowledge and skills by coaching, mentoring or training others
Reading	• Gathers, interprets and analyses texts in organisational documents to facilitate performance management
Writing	• Plans and prepares documents for allocating work and managing performance suitable for the target audience and in accordance with organisational requirements

Oral Communication	• Uses language and structure appropriate to context and audience to explain expected standards of performance, provide feedback and coach staff
Self-management	• Applies legal and regulatory responsibilities related to own work and the organisation as a whole • Adheres to organisational policies and procedures
Teamwork	• Applies the protocols governing what to communicate to whom and how in a range of work contexts • Collaborates with others to achieve joint outcomes, influencing direction and taking a leadership role on occasion
Planning and organising	• Sequences and schedules complex activities, monitors implementation and manages relevant communication • Seeks advice, feedback and support, as required to assist in the decision-making process • Uses experiences to reflect on the ways in which variables impact on performance

Unit Mapping Information

Supersedes and is equivalent to BSBMGT502 Manage people performance.

Supersedes but is not equivalent to:

- BSBMGT404 Lead and facilitate off-site staff
- BSBSLS502 Lead and manage a sales team.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBLDR522 Manage people performance

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- manage performance of at least two individuals
- manage performance of at least one team.

In the course of the above, the candidate must:

- consult with stakeholders to identify work requirements, performance standards and agreed performance indicators
- develop work plans and allocate work to achieve outcomes efficiently and within organisational and legal requirements
- assess performance against performance indicators according to performance management and review processes
- monitor, evaluate and provide feedback on performance and provide coaching or training, as needed
- keep records and documentation in accordance with the organisational performance management system
- reinforce excellence in performance through recognition and continuous feedback
- respond to underperforming individuals according to organisational policies, as required.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- legislative and regulatory and organisational requirements for performance management and review
- organisational risk management plan
- organisational human resource support services
- organisational performance measurement systems
- key features of unlawful dismissal rules and due process

- staff development options and information.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- legislation on performance management
- workplace documentation and resources for performance management and review.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBOPS402 Coordinate business operational plans

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to implement operational plans by planning and acquiring resources, monitoring and adjusting operational performance and providing reports on performance, as required.

The unit applies to individuals who plan activities to achieve team and organisational objectives. At this level, work will normally be carried out within routine and non-routine methods and involve procedures that require planning, evaluation, leadership and guidance of others.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Business Competence – Business Operations

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare to implement operational plan	1.1 Consult with stakeholders to identify resource requirements relevant to operational plan 1.2 Collate, analyse and document details of resource requirements 1.3 Develop operational plan and determine implementation method 1.4 Plan for contingencies 1.5 Develop and present proposals for resource requirements
2. Implement operational plan	2.1 Assist in recruiting and onboarding employees required to implement operational plan according to organisational policies

ELEMENT	PERFORMANCE CRITERIA
	and procedures 2.2 Acquire physical resources and services according to organisational policies and procedures 2.3 Support efficient, cost-effective and safe use of resources 2.4 Adjust implementation of the operational plan in consultation with others to manage contingencies
3. Monitor operational performance	3.1 Collate relevant information and determine operational and productivity performance 3.2 Identify and use key performance indicators (KPIs) and assess operational performance 3.3 Identify unsatisfactory performance and take action to rectify the situation according to organisational policies
4. Review operations based on performance	4.1 Develop recommendations for variation to operational plans 4.2 Present recommendations to the designated persons or groups to gain approval 4.3 Maintain records related to operational performance according to organisational policies and procedures 4.4 Report information on operational performance to management

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Description
Reading	• Identifies, interprets, analyses and reviews textual information related to the operational plan and monitoring of operational performance
Writing	• Communicates relationships between ideas and information, matching style of writing to purpose and audience • Researches, plans and prepares workplace documentation for relevant stakeholders using organisational formats
Oral communication	• Participates in a variety of spoken exchanges with a range of audiences varying structure and language to suit the audience
Numeracy	• Selects and uses familiar mathematical techniques to organise timely supply of adequate resources for the operational plan and to use budgetary information to monitor performance
Enterprise and initiative	• Monitors adherence to organisational policies and procedures and considers own role in terms of its contribution to broader goals of the work environment

Skill	Description
Teamwork	• Selects and uses appropriate conventions and protocols when communicating with diverse individuals to build rapport, seek or present information • Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group communication, influencing direction and taking a leadership role on occasion
Planning and organising	• Takes responsibility for planning, organising, implementing and monitoring tasks required to achieve required outcomes • Evaluates effectiveness of decisions in terms of how well they met stated goals • Identifies and addresses an increasing range of familiar problems by implementing contingency plans

Unit Mapping Information

No equivalent unit. Supersedes but is not equivalent to:

- BSBFLM305 Support operational plan
- BSBMGT402 Implement operational plan.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBOPS402 Coordinate business operational plans

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- prepare, implement and review two operational plans.

In the course of the above, the candidate must:

- interact with a range of people and groups to identify resource requirements, performance objectives, systems, procedures and records relating to the operational plan
- plan and acquire physical and human resources using organisation's systems and procedures
- manage and support personnel to achieve performance objectives including facilitating new employee onboarding
- present information and recommendations to support implementation and variation of the operational plan
- monitor operational performance against the performance objectives and budgets and implement improvements to rectify unsatisfactory performance
- vary the operational plan and gain approval to deal with contingencies
- document and provide reports on performance as required by the organisation.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- processes to identify resource requirements
- sources of information to identify resource requirements
- methods to manage contingencies including through consultation with relevant stakeholders
- key features of performance monitoring systems and processes
- common methods for problem solving
- methods to support staff including mentoring, coaching and supervision

- implementation methods for operational plan
- budget and other financial information related to the organisation
- organisational objectives including costs, identified shortfalls and surpluses.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- organisational operational plans, policies and procedures relevant to performance evidence
- workplace documentation and resources including budgets
- physical and human resource procurement documentation
- employee onboarding and performance monitoring procedures.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBOPS502 Manage business operational plans

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to develop and monitor the implementation of operational plans to support efficient and effective workplace practices and organisational productivity and profitability.

The unit applies to individuals who manage the work of others and operate within the parameters of a broader strategic and/or business plans.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Business Competence – Business Operations

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Establish operational plan	1.1 Research, analyse and document resource requirements 1.2 Develop operational plan in consultation with, and with approval from, relevant stakeholders 1.3 Develop contingencies for operational plan 1.4 Explain plan to relevant work teams
2. Manage resource acquisition	2.1 Confirm that employees are recruited and inducted according to the organisation's human resources management policies, practices and procedures 2.2 Confirm that physical resources and services are acquired according to the organisation's policies, practices and procedures

ELEMENT	PERFORMANCE CRITERIA
	2.3 Identify and incorporate requirements for intellectual property rights and responsibilities related to acquisition of resources
3. Monitor and review operational performance	3.1 Assess progress of operational plan in achieving profit and productivity plans and targets 3.2 Identify areas of under-performance, recommend solutions and rectify the situation 3.3 Plan and implement relevant processes for ongoing monitoring and confirm that support is provided for individuals and teams 3.4 Negotiate recommendations for variations to operational plans and gain approval from designated persons

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Description
Reading	• Gathers, interprets and analyses workplace documentation to determine requirements for the operational plan
Writing	• Develops and documents a range of detailed texts relating to the management of an operational plan according to organisational requirements
Oral communication	• Presents information to a range of audiences using appropriate register, vocabulary and paralinguistic features • Listens and comprehends information from a variety of spoken exchanges with clients, co-workers and other stakeholders
Numeracy	• Selects and uses mathematical problem-solving strategies to organise resource requirements, performance benchmarks and financial viability of the operational plan
Enterprise and initiative	• Monitors adherence to organisational policies, procedures and considers own role in terms of its contribution to broader goals of the work environment
Teamwork	• Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction, influencing direction and taking a leadership role on occasion
Planning and organising	• Takes responsibility for developing and implementing systems and processes to achieve organisational objectives, seeking advice, feedback and support as required to assist in the development and planning phase • Sequences and schedules complex activities, monitors

Skill	Description
	implementation, and manages relevant communication
Problem solving	• Uses systematic analytical processes to aid decision making, identify potential problems and generate contingency plans or solutions
Technology	• Demonstrates awareness of the importance of data security in a digital environment

Unit Mapping Information

Supersedes and is equivalent to BSBMGT517 Manage operational plan.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBOPS502 Manage business operational plans

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- manage an operational plan for at least one business or work area.

In the course of the above, the candidate must:

- develop and implement an operational plan using a variety of information sources and consultation including:
  - resource requirements
  - key performance indicators
  - monitoring processes
  - contingency plans
- communicate with stakeholders to explain the plan and supporting information, seek approvals, negotiate variations and engage work teams
- confirm existence of relevant strategies, including strategies relating to:
  - recruiting, inducting and developing personnel
  - acquiring physical resources and services
  - protecting intellectual property
  - making variations to the plan
  - monitoring and documenting performance.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- stakeholders involved in development and management of operations plan including escalation points, colleagues and specialist resource managers
- key information sources for proposal development and presentation including resource requirement specialists

- consultation processes
- content of operational plans, including:
  - procurement processes
  - employee recruitment and induction strategies
  - physical resource and service acquisition strategies
  - key indicators of organisational performance
- budget and actual financial relating to profit and productivity
- methods for preparing operational plans and contingency plans
- role of an operational plan in achieving an organisation's objectives
- procedures and records associated with documenting performance
- approaches for developing key performance indicators to meet business objectives
- legislative and regulatory framework relating to the development and implementation of operational plan of the organisation, including:
  - fair trading laws
  - work health and safety
- organisational policies, practices and procedures that relate to the operational plan.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- legislation and regulations relevant to operational plans
- workplace documentation and resources relevant to performance evidence.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBOPS505 Manage organisational customer service

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to develop strategies to manage organisational systems that ensure products and services are delivered and maintained to standards agreed by the organisation.

The unit applies to individuals who supervise customer service provided by others within an organisation. At this level, individuals must exercise considerable discretion and judgement, using a range of problem solving and decision making strategies.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Business Competence – Business Operations

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Establish customer requirements	1.1 Consult with customers to identify customer service requirements 1.2 Integrate customer feedback into organisation's business plan 1.3 Identify and procure resources required to address customer service requirements
2. Deliver quality products and services	2.1 Deliver product and service according to customer specifications within organisation's business plan 2.2 Monitor team performance and assess against the organisation's quality and delivery standards 2.3 Support colleagues to overcome difficulties in meeting

ELEMENT	PERFORMANCE CRITERIA
	customer service standards
3. Evaluate customer service	3.1 Develop and use strategies for monitoring progress against product and service targets and standards 3.2 Develop and use strategies for obtaining customer feedback on provision of product and service 3.3 Adapt delivery of customer product and service in consultation with relevant individuals and groups 3.4 Manage records, reports and recommendations within the organisation's systems and processes

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Description
Reading	• Interprets and analyses textual information from a variety of sources and applies the knowledge that has been gained to evaluate standards for organisation's products and services
Writing	• Produces a range of text types to convey information, requirements or recommendations matching style of writing to purpose and audience
Oral communication	• Clearly articulates systems and standards in a team environment using language suitable to diverse audiences • Uses listening and questioning techniques to obtain feedback and confirm understanding
Numeracy	• Interprets and comprehends mathematical information in organisation's business and customer service plans
Planning and organising	• Recognises and applies organisational protocols and meets expectations associated with own work
Teamwork	• Identifies and uses appropriate conventions and protocols when communicating with colleagues and customers • Collaborates with others, taking into account their strengths and experience, to achieve desired outcomes • Provides support in field of expertise to team
Enterprise and initiative	• Develops and implements plans using logical processes and monitors and evaluates progress against stated goals
Problem solving	• Accepts responsibility for addressing complex or non-routine difficulties, applying problem solving processes in determining a

Skill	Description
	solution
Technology	• Uses digital technology to access, organise and present information in a format that meets requirements

Unit Mapping Information

Supersedes and is equivalent to BSBCUS501 Manage quality customer service.

Supersedes but is not equivalent to:

- BSBCUE504 Integrate customer engagement within the organisation
- BSBCUE601 Optimise customer engagement operations
- BSBCUE602 Manage customer engagement information
- BSBCUE603 Design and launch new customer engagement facilities
- BSBSLS501 Develop a sales plan.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBOPS505 Manage organisational customer service

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- develop and review strategy for delivering and monitoring quality customer service for an organisation or work area.

In the course of the above, the candidate must:

- implement quality customer service policies and procedures
- identify and resolve system problems relating to poor customer service
- assist teams to meet customer service requirements
- develop, procure and use human and physical resources to support quality customer service delivery.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- legislative and regulatory frameworks governing customer service
- elements of effective customer service including quality, time and cost
- organisational policies and procedures for customer service and handling customer complaints
- relevant service standards and best practice models
- key principles of public relations and product promotion
- common techniques for solving complaints
- principles and techniques involved in managing:
  - customer behaviour
  - specific customer needs
  - customer research
  - customer relations

  - ongoing product and service quality
  - problem identification and resolution
  - quality customer service delivery
  - record keeping and management methods
- strategies for monitoring, managing and introducing ways to improve customer service relationships
- strategies to obtain customer feedback.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- legislation, regulations and codes of practice related to customer service
- workplace documentation and resources
- complex customer complaints.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBPEF501 Manage personal and professional development

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to implement systems and process that support the personal and professional development of self and others.

The unit applies to individuals working in a range of managerial positions who are accountable for the development and performance of others.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Critical Thinking & Problem Solving – Personal Effectiveness

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Manage work goal development	1.1 Document team member responsibilities and identify organisational framework for development of work goals 1.2 Support others to develop work goals, plans and activities that align with their responsibilities 1.3 Assess others' work goals, plans and activities for alignment with organisational goals and provide feedback to team members 1.4 Facilitate access to personal and professional development opportunities that align to team member goals, plans and activities
2. Facilitate achievement of work priorities	2.1 Assess and prioritise personal, team and organisational demands 2.2 Use technology to manage work priorities of the team

ELEMENT	PERFORMANCE CRITERIA
	2.3 Identify and implement techniques to manage team health and wellbeing in the workplace
3. Develop and maintain professional competence	3.1 Document own development needs, priorities and plans using applicable competency standards, where required 3.2 Seek feedback from relevant personnel on own development needs 3.3 Participate in personal and professional development activities that address identified needs, priorities and plans

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

Skill	Description
Learning	• Investigates and uses a range of strategies to develop personal competence
Reading	• Analyses and interprets textual information from organisational policies and practices or feedback to inform personal development planning
Writing	• Uses feedback to prepare reports that summarise ways to improve competence
Oral communication	• Uses active listening and questioning to seek and receive feedback
Enterprise and Initiative	• Identifies how own role contributes to broader organisational goals • Considers organisational protocols when planning career development of self and others
Teamwork	• Selects and uses appropriate conventions and protocols when communicating with diverse stakeholders • Uses interpersonal skills to establish and build positive working relationships with others
Planning and organising	• Plans and prioritises tasks in order to meet deadlines, manage role responsibilities and to manage own personal welfare • Identifies and uses appropriate technology to improve work efficiency
Technology	• Uses technology to manage and prioritise work tasks

Unit Mapping Information

No equivalent unit. Supersedes but is not equivalent to:

- BSBLED503 Maintain and enhance professional practice
- BSBWOR501 Manage personal work priorities and professional development.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBPEF501 Manage personal and professional development

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- develop and implement a plan for own personal and professional development
- manage personal and professional development of at least two other individuals.

In the course of the above, the candidate must:

- identify roles and responsibilities of team members
- support two different individuals to develop work goals that align with their role and responsibilities
- facilitate team member access to relevant personal and professional development activities
- use technology to organise and prioritise tasks and commitments of a team or work area
- research and implement techniques for maintaining health and wellbeing of self and others
- develop personal work goals, plans and activities to meet work goals
- measure personal work performance, including assessing competency against competency standards
- participate in personal and professional development activities to develop professional competence.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- roles and responsibilities of team members
- principles and techniques involved in the management or organisation of:
  - performance measurement
  - personal behaviour, self-awareness and personality traits identification
  - personal development plans
  - personal goal setting

- task prioritisation
- common personal and professional development activities relevant to the industry
- technology to plan and prioritise work tasks
- techniques to manage health and wellbeing in the workplace
- organisation's human resources policies and procedures relevant to professional development.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to challenges and situations to demonstrate the application of performance evidence.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBSTR402 Implement continuous improvement

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to implement continuous improvement of systems and processes of an organisation. It includes using systems and strategies to encourage the team to participate in the process, monitoring and reviewing performance, and identifying opportunities for further improvements.

The unit applies to managers who are responsible for implementing the continuous improvement process to achieve the objectives of the organisation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Critical Thinking and Problem Solving – Business Strategy

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Identify and plan for improvement	1.1 Identify relevant stakeholders and establish improvements required 1.2 Identify where new systems and processes could be implemented 1.3 Promote team involvement in decision making processes for team systems and processes 1.4 Communicate and agree on new improvement systems and processes with relevant stakeholders 1.5 Manage reports and recommendations for using systems and processes of the organisation

ELEMENT	PERFORMANCE CRITERIA
	1.6 Establish risk review processes
2. Monitor implementation of continuous improvement	2.1 Use workplace systems and technology, and monitor team performance according to organisational policies and procedures 2.2 Implement new systems and processes in consultation with relevant stakeholders 2.3 Maintain new system and processes in consultation with relevant stakeholders 2.4 Identify and resolve system and process issues
3. Evaluate implementation of continuous improvement	3.1 Communicate productivity improvements to relevant stakeholders and confirm their understanding 3.2 Seek and respond to feedback from relevant stakeholders on proposed improvement systems and process 3.3 Review improvement systems and process, and make changes, as required

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Reading	• Evaluates and integrates facts and ideas to construct meaning from a range of text types in order to implement continuous improvement systems and processes
Writing	• Selects vocabulary, grammatical structures and conventions appropriate to text • Researches, plans and prepares continuous improvement documentation for required stakeholders
Oral communication	• Participates in a variety of spoken exchanges with a range of audiences using structure and language to suit the audience
Initiative and enterprise	• Monitors adherence to organisational policies and procedures and considers own role in terms of its contribution to broader goals of the work environment • Recognises the potential of new approaches to enhance work practices and outcomes • Uses systematic, analytical processes in complex, non-routine situations, setting goals, gathering required information and identifying and evaluating options against agreed criteria

SKILL	DESCRIPTION
Teamwork	• Selects and uses required conventions and protocols when communicating with diverse individuals to seek and share information • Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group communication, influencing direction and taking a leadership role on occasion
Self-management	• Evaluates effectiveness of decisions in terms of how well they meet stated goals
Technology	• Uses digital applications to access and filter data, extract, organise, integrate and share required information
Planning and organising	• Takes responsibility for planning and organising own workload to achieve required outcomes

Unit Mapping Information

Supersedes and is equivalent to BSBMGT403 Implement continuous improvement.

Supersedes but is not equivalent to:

- BSBCON401 Work effectively in a business continuity context
- BSBMGT406 Plan and monitor continuous improvement.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBSTR402 Implement continuous improvement

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- implement at least one continuous improvement system or process in an organisation or work area.

In the course of the above, the candidate must:

- provide support to enable individuals and teams to participate in decisions, take responsibility, show initiative and implement improvement processes
- communicate effectively to support the implementation of improvements and improvement system and processes
- implement, monitor and update improvement plans, processes and procedures to improve performance
- document performance to identify further opportunities for improvement
- manage records and reports in the systems and procedures of the organisation.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- continuous improvement systems and processes
- coaching and mentoring needs to support continuous improvement
- change management techniques that support continuous improvement and initiative
- organisation's systems and data used for benchmarking and monitoring performance for continuous improvement.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- workplace documentation and resources relevant to performance evidence.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBSTR501 Establish innovative work environments

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to create an environment that enables and supports practice which focuses on a holistic approach to the integration of innovation across all areas of work practice.

The unit applies to individuals working in leadership or management roles in any industry or community context. The individual could be employed by the organisation, but may also be an external contractor, the leader of a cross organisation team or of a self-formed team of individuals.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Critical Thinking and Problem Solving – Business Strategy

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Establish work practices	1.1 Identify relevant stakeholders 1.2 Identify organisational objectives and practices 1.3 Evaluate current work conditions 1.4 Determine working conditions that allow innovative practices according to organisational policies and procedures 1.5 Identify organisational resources relating to innovation 1.6 Build and lead team and maximise opportunities for innovation
2. Create an innovative	2.1 Evaluate the impacts of changing work environment

ELEMENT	PERFORMANCE CRITERIA
environment	2.2 Collaborate with stakeholders and develop ideas for enhancing work environment 2.3 Identify and select resources required for enhancing work environment 2.4 Assess the ability of the workspace to support innovation 2.5 Assist team members to adapt and perform in new work environment
3. Implement innovative work environment	3.1 Encourage creative mindsets, collaborative working and development of positive workplace relationships 3.2 Reinforce the value of innovation according to organisational vision and objectives 3.3 Take risks to open up opportunities for innovation 3.4 Select ways of celebrating and encouraging innovation 3.5 Encourage and support evaluation of innovative ideas
4. Share and evaluate innovative ideas and work environment	4.1 Share relevant information, knowledge and skills on innovative practices with stakeholders 4.2 Provide and encourage formal and informal learning opportunities to develop skills required for innovation 4.3 Create opportunities where individuals can learn from the experience of others 4.4 Seek and respond to suggestions, improvements and innovations from all team members

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Reading	• Interprets and evaluates information that may deal with complex ideas related to issues both within and outside a given workplace context
Writing	• Develops information for others using language to suit the context and audience
Oral communication	• Presents ideas and concepts to a range of audiences using structure and language to suit the audience • Uses active listening and questioning to discuss and clarify information and to confirm understanding
Self-management	• Takes responsibility for implementing practices and procedures to achieve organisational objectives in innovation according to role

SKILL	DESCRIPTION
	requirements • Accepts responsibility for planning and implementing tasks and practices to achieve organisational goals, negotiating key aspects with others and taking into account current capabilities and needs
Initiative and enterprise	• Develops new and innovative ideas through exploration, evaluation, analysis and critical thinking
Teamwork	• Uses required communication techniques to build rapport and foster strong relationships with co-workers in a range of work contexts • Uses inclusive and collaborative techniques to share, promote and convey complex information about new ideas and systems within the workplace • Facilitates a climate where people feel comfortable suggesting and discussing improvements and new ideas
Problem Solving	• Uses problem solving processes to identify, assess and respond to challenges and risks around innovation

Unit Mapping Information

No equivalent unit. Supersedes but is not equivalent to:

- BSBINN501 Establish systems that support innovation
- BSBINN502 Build and sustain an innovative work environment.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBSTR501 Establish innovative work environments

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- establish at least two different procedures and practices that foster innovation in areas of work practice, including at least three of the following:
  - collaborative work arrangements
  - building team capacity to contribute to innovation
  - providing formal and informal learning opportunities
  - evaluating ideas of innovation in work environment
  - celebrating and encouraging innovation
  - consulting with relevant stakeholders
  - changing physical work environment, including designing, fitting-out and decorating workspaces
  - communicating and sharing of ideas and feedback.

In the course of the above, the candidate must:

- reinforce the value of innovation to the vision and objectives of the organisation
- model behaviour, including:
  - being receptive to ideas
  - giving constructive advice
  - establishing and maintaining relationships based on mutual respect and trust
  - taking considered risks that provide opportunities for innovation
- support innovation and collaboration of ideas to make improvements.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- concepts and theories of innovation

- context for innovation in the workplace, including:
  - core business values
  - overall objectives
  - broader environmental context
  - value and benefit of innovative ideas and projects
- factors and tools that motivate individuals
- creative thinking and innovative work practices
- ways of celebrating and promoting innovation in the workplace
- approaches to management and leadership and how they support and hinder innovation
- challenges and barriers to innovation and ways of overcoming them, including:
  - rewarding and celebrating innovation
  - coaching and learning
  - modelling behaviour and managing the physical environment.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- relevant legislation and codes of practice
- relevant organisational policies and procedures
- workplace equipment and resources.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBSTR502 Facilitate continuous improvement

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to lead and manage continuous improvement systems and processes. Particular emphasis is on the development of systems and the analysis of information to monitor and adjust performance strategies, and to manage opportunities for further improvements.

The unit applies to individuals who take an active role in managing a continuous improvement process in order to achieve an organisation's objectives. At this level, work will normally be carried out using complex and diverse methods and procedures which require the exercise of considerable discretion and judgement, using a range of problem-solving and decision-making strategies.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Critical Thinking and Problem Solving – Business Strategy

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Establish systems and processes	1.1 Identify current systems and processes that facilitate continuous improvement 1.2 Identify and define improvement needs and opportunities for the organisation 1.3 Develop decision-making processes to assist continuous improvement and communicate to relevant stakeholders 1.4 Develop strategies for continuous improvement and encourage

ELEMENT	PERFORMANCE CRITERIA
	team members to participate in decision-making processes 1.5 Develop knowledge management systems to capture team progress, insights and experiences from business activities 1.6 Develop new systems and processes that facilitate continuous improvement according to improvement needs and opportunities 1.7 Establish processes that confirm team members are informed about continuous improvement outcomes
2. Monitor and adjust performance strategies	2.1 Confirm relevant systems and processes meet organisation sustainability requirements 2.2 Confirm team progress, insights and experiences are captured and accessible using knowledge management systems 2.3 Coach individuals and teams to implement and support continuous improvement systems and processes 2.4 Identify and evaluate ways in which planning and operations could be improved 2.5 Make recommendations and communicate strategies to relevant stakeholders
3. Manage opportunities for further improvement	3.1 Evaluate outcomes and identify opportunities for improvement 3.2 Seek feedback from relevant stakeholders on systems and processes 3.3 Identify other areas for improvement and document feedback for future planning

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Reading	• Identifies and extracts required information from a range of complex texts • Locates, interprets and analyses workplace documentation to gather information relating to continuous improvement
Writing	• Develops complex texts related to continuous improvement processes according to organisational requirements • Ensures the vocabulary, grammatical structures and conventions are required for the context and target audience
Oral	• Presents information to a range of audiences using appropriate structure and language

SKILL	DESCRIPTION
communication	• Listens and comprehends information from a variety of spoken exchanges with clients, co-workers and other stakeholders • Confirms understanding through questioning and active listening
Initiative and enterprise	• Monitors adherence to organisational policies, procedures and protocols and considers own role in terms of its contribution to broader goals of the work environment • Identifies and uses appropriate conventions and protocols when communicating with colleagues and external stakeholders
Problem solving	• Uses analytical and lateral thinking to review current practices and develop ideas for improvement
Teamwork	• Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction and influencing direction
Self-management	• Takes responsibility for developing, implementing and monitoring systems and processes to achieve organisational outcomes
Technology	• Reflects on the ways in which digital systems and tools are used, or could be used, to achieve work goals

Unit Mapping Information

Supersedes and is equivalent to BSBMGT516 Facilitate continuous improvement.

Supersedes but is not equivalent to BSBCUE501 Develop business continuity strategy.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBSTR502 Facilitate continuous improvement

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- lead and manage continuous improvement systems and processes for at least one organisation or work area.

In the course of the above, the candidate must:

- address organisational sustainability requirements
- incorporate mentoring, coaching and other support to enable individuals to participate in continuous improvement processes
- capture progress, insights and experiences using established knowledge management systems
- encourage participation in decision making processes and ideas for continuous improvement.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- systems and processes facilitating continuous improvement
- common decision-making processes
- organisational policies and procedures relating to digital systems, decision-making processes and continuous improvement systems
- business systems and requirements, including:
  - knowledge management
  - quality
  - sustainability
  - performance management.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- workplace documentation and resources relevant to performance evidence
- organisational policies and procedures relevant to performance evidence.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBSUS511 Develop workplace policies and procedures for sustainability

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to develop and implement workplace sustainability policies and to modify the policy to suit changed circumstances.

The unit applies to individuals with managerial responsibilities who undertake work developing approaches to create, monitor and improve strategies and policies within workplaces. These individuals also engage with a range of relevant stakeholders and specialists.

'Sustainability' in this unit refers to a broad approach that focuses on the minimisation of an organisation's social, economic and environmental impact, as well as proactive value creation in these areas.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Business Competence – Sustainability

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare workplace sustainability policies	1.1 Establish scope and objectives of workplace sustainability policies 1.2 Gather information for development of sustainability policies 1.3 Analyse information and consultation insights 1.4 Develop and document sustainability policies according to organisational processes

ELEMENT	PERFORMANCE CRITERIA
	1.5 Incorporate implementation and continuous improvement processes into sustainability policies
2. Implement workplace sustainability policies	2.1 Present workplace sustainability policies and implementation processes to key stakeholders 2.2 Identify and source resources required to implement sustainability policies 2.3 Support implementation of workplace sustainability policies 2.4 Track continuous improvements in sustainability approaches using recording systems
3. Review implementation of workplace sustainability policies	3.1 Document outcomes and provide feedback to key personnel and stakeholders 3.2 Identify trends requiring remedial action to promote continuous improvement of performance 3.3 Modify sustainability policies to incorporate improvements

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

Skill	Description
Numeracy	• Interprets and uses mathematical equations to calculate numerical information relating to time durations and costs
Oral communication	• Presents information and seeks advice using language appropriate to audience • Participates in discussions using listening and questioning to elicit the views of others and to clarify or confirm understanding
Reading	• Identifies, analyses and evaluates complex textual information to determine legislative and regulatory requirements, trends and outcomes
Writing	• Researches, plans and prepares documentation using format and language appropriate to context, organisational requirements and audience
Initiative and enterprise	• Develops, monitors and modifies organisational policies and procedures according to legislative requirements and organisation goals
Teamwork	• Selects and uses appropriate conventions and protocols when communicating with internal and external stakeholders to seek or share information • Plays a lead role in consulting and negotiating positive outcomes with

Skill	Description
	a range of stakeholders
Planning and organising	• Plans, organises and implements work activities of self and others that ensure compliance with organisational policies and procedures, and legislative requirements • Sequences and schedules complex activities, monitors implementation, and manages relevant communication • Uses systematic, analytical processes in relatively complex, situations, setting goals, gathering relevant information, and identifying and evaluating options against agreed criteria • Evaluates outcomes of decisions to identify opportunities for improvement

Unit Mapping Information

Supersedes and is equivalent to BSBSUS501 Develop workplace policy and procedures for sustainability.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBSUS511 Develop workplace policies and procedures for sustainability

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- develop and implement workplace policies and procedures for sustainability on at least one occasion, including:
  - implementing sustainability policy and procedures into wider organisational policies and procedures
  - consulting and communicating with relevant stakeholders to generate engagement with sustainability policy development, implementation and continuous improvement.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- Australian and international standards relating to corporate sustainability
- environmental and sustainability legislation, regulations and codes of practice applicable to organisation
- internal and external sources of information and their use in planning and developing organisational sustainability policies and procedures
- elements required for the development of organisational sustainability policies and processes including:
  - agreed outcomes of the policy and procedures
  - policy timeframes and costs
  - performance indicators
  - activities to be undertaken
  - assigned responsibilities
  - record keeping, review and improvement processes
  - common sustainability issues with organisational systems and procedures

- typical barriers to implementing policies and procedures in an organisation and possible strategies to address them.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- corporate sustainability legislation, regulations, standards and codes
- organisational documentation on sustainability and sustainable practices.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

BSBTWK502 Manage team effectiveness

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to lead teams in the workplace and to actively engage with the management of the organisation.

The unit applies to individuals working at a managerial level who lead and build a positive culture within their work teams. At this level, work will normally be carried out using complex and diverse methods and procedures requiring the exercise of considerable discretion and judgement. It will also involve using a range of problem solving and decision-making strategies.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Unit Sector

Social Competence – Teamwork and Relationships

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Establish team performance plan	1.1 Identify team purpose, roles, and responsibilities according to organisational and task objectives 1.2 Develop performance plans with expected outcomes, key performance indicators (KPIs) and goals for work team 1.3 Support team members in meeting expected performance outcomes
2. Develop and facilitate team cohesion	2.1 Develop strategies for facilitating team member input into planning, decision making and operational aspects of team tasks 2.2 Develop or modify policies and procedures for promoting team

ELEMENT	PERFORMANCE CRITERIA
	member accountability for personal work and team tasks 2.3 Provide feedback to team members on team effort and contributions 2.4 Develop processes for identifying and addressing issues, concerns and problems identified by team members
3. Facilitate teamwork	3.1 Encourage team members to participate in and to take responsibility for team activities 3.2 Support the team in identifying and resolving work performance problems 3.3 Promote work team collaboration through individual behaviour
4. Liaise with stakeholders	4.1 Establish and maintain open communication processes with relevant stakeholders 4.2 Communicate information from line management to the team 4.3 Communicate and follow-up unresolved issues, concerns and problems raised by team members with line management 4.4 Address unresolved issues, concerns and problems raised by stakeholders

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

SKILL	DESCRIPTION
Reading	• Analyses and interprets textual information from the organisation's policies, goals and objectives to establish team goals or to determine corrective action
Writing	• Prepares workplace documentation that communicates complex information clearly and effectively
Oral Communication	• Engages in discussions or provides information using appropriate vocabulary and non-verbal features • Uses listening and questioning techniques to confirm understanding and to engage the audience
Enterprise and initiative	• Identifies how own role contributes to broader organisational goals • Modifies or develops policies and procedures to achieve organisational goals
Teamwork	• Selects and uses appropriate conventions and protocols when communicating with diverse stakeholders • Uses interpersonal skills to gain trust and confidence of team and

	provides feedback to others in forms that can be understood and used • Adapts personal communication style to build positive working relationships and to show respect for the opinions, values and particular needs of others
Planning and organising	• Develops, implements and monitors plans and processes to ensure team effectiveness • Monitors and actively supports processes and development activities to ensure the team is focused on work outcomes • Plans for unexpected outcomes and implements creative responses to overcome challenges

Unit Mapping Information

Supersedes and is equivalent to BSBWOR502 Lead and manage team effectiveness.

Supersedes but is not equivalent to:

- BSBMGT520 Plan and manage the flexible workforce
- BSBWRK409 Prepare for and participate in dispute resolution.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

Assessment Requirements for BSBTWK502 Manage team effectiveness

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- manage the effectiveness of at least one work team.

In the course of the above, the candidate must:

- provide feedback to encourage, value and reward others
- model desired behaviour and practices
- encourage and foster shared understanding of purpose, roles and responsibilities
- support team to meet expected performance outcomes including providing formal and informal learning opportunities as needed
- develop performance plans with key performance indicators (KPIs), outputs and goals for individuals or the team which incorporate input from stakeholders
- communicate effectively with a range of stakeholders about team performance plans and team performance
- evaluate and take necessary corrective action regarding unresolved issues, concerns and problems raised by internal or external stakeholders.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- impacts of group dynamics on team performance
- methods of establishing team activities including communication processes
- strategies that can support team cohesion, participation and performance
- strategies for gaining consensus
- issue resolution strategies.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- workplace documents relevant to team task objectives.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

CPCCLDG3001 Licence to perform dogging

Modification History

Release 2 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.1.

Minor edits to formatting.

Release 1 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.0.

Supersedes and is equivalent to CPCCLDG3001A Licence to perform dogging. Updated to meet the Standards for Training Packages 2012.

Application

This unit specifies the skills and knowledge required to safely perform dogging work. Dogging consists of the application of slinging techniques to move a load, including the selection and inspection of lifting gear, and the directing of a plant operator in the movement of a load when the load is out of sight of the operator.

Dogging work is conducted in the construction industry and other industries where loads are lifted and moved using cranes or hoists.

Completion of the general construction induction training program, specified in the Safe Work Australia model Code of Practice: Construction Work, is required by anyone carrying out construction work. Achievement of CPCCWHS1001 Prepare to work safely in the construction industry meets this requirement.

Competence in this unit does not in itself result in a licence. A licence is obtained after competence is assessed under applicable Commonwealth, state or territory work health and safety (WHS) regulations.

Pre-requisite Unit

Nil.

Unit Sector

Licencing

Elements and Performance Criteria

Elements describe the Performance criteria describe what needs to be done to

essential outcomes.	demonstrate achievement of the element.
1 Plan task.	1.1 Review task instructions, consult with relevant persons to seek clarification as required, and obtain relevant workplace information.
	1.2 Obtain and interpret information, including safe work method statements (SWMSs), required to ensure that activities are performed in compliance with workplace-specific and safe work requirements.
	1.3 Obtain and interpret information required to ensure that equipment inspection, use, maintenance and storage complies with manufacturer requirements.
	1.4 Identify workplace and task-specific hazards and determine required risk controls and safety measures and equipment, including signs and barricades, personal protective equipment (PPE), and fall prevention and fall arrest equipment.
	1.5 Calculate load weight, dimensions and centre of gravity.
	1.6 Determine lifting and slinging points.
	1.7 Calculate derated working load limit (WLL) of lifting equipment resulting from selected slinging techniques.
	1.8 Establish required communication methods with plant operator.
2 Select and inspect equipment.	2.1 Select risk controls and equipment, including fall prevention and fall arrest equipment, and check that it is working and fit for purpose.
	2.2 Select and check PPE.
	2.3 Select lifting equipment and gear, inspect for defects, and isolate, tag out, report and record defective items.
	2.4 Select communication equipment and check that it is working and fit for use.
3 Set up task.	3.1 Establish and maintain communication with relevant persons to ensure lift plan and risk controls are communicated clearly, including any impact on other

		workplace activities.
	3.2	Ensure risk controls and safety measures and equipment have been put in place.
	3.3	Prepare lifting equipment and gear for safe use.
	3.4	Consult with relevant persons to ensure that the load destination is stable, able to bear the load and prepared for safe access and landing.
	3.5	Attach and secure lifting equipment and gear to the plant-designated lifting point.
4 Perform task.	4.1	Direct plant designated lifting point/hook, over the load's centre of gravity.
	4.2	Attach and secure lifting equipment and gear to the load using slinging techniques.
	4.3	Attach and secure tag line as required to guide the load.
	4.4	Use signals and radio communication methods to direct the load movement, both in and out of sight of the plant operator.
	4.5	Conduct test lift to check the security of the slings and the stability of the load, lifting equipment and gear.
	4.6	Direct the movement of the load in accordance with lift plan, including lowering and landing.
	4.7	Disconnect lifting gear from the load and direct the positioning of crane or hoist for next task.
5 Pack up and clean up.	5.1	Remove excess materials from work area.
	5.2	Inspect lifting equipment and gear for defects, and isolate, label and report defective items.
	5.3	Store lifting equipment and gear in accordance with workplace requirements.
	5.4	Remove risk controls and safety measures and equipment.

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

Supersedes and is equivalent to CPCCLDG3001A Licence to perform dogging.

Links

Companion volumes to this training package are available at the VETNet website - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

Assessment Requirements for CPCCLDG3001 Licence to perform dogging

Modification History

Release 2 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.1.

Minor edits to formatting.

Release 1 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.0.

Supersedes and is equivalent to CPCCLDG3001A Licence to perform dogging. Updated to meet the Standards for Training Packages 2012.

Performance Evidence

To demonstrate competency in this unit, a candidate must meet the elements and performance criteria by slinging and directing the movement of at least five loads of differing shapes, sizes and weights.

The loads must be moved by a slewing mobile crane of a maximum rated capacity of at least seven tonnes.

The candidate must:

- check relevant workplace information, including safe work method statements (SWMSs), and equipment service and maintenance records and checklists
- perform all activities in compliance with safe work practices and workplace-specific procedures and policies, and check, use, maintain and store equipment in compliance with manufacturer requirements
- identify hazards and use appropriate risk controls and safety measures and equipment
- determine load weight and travel path in consultation with crane operator
- select and inspect appropriate lifting gear and apply slinging techniques appropriate to the type of load, its mass and centre of gravity
- identify the working load limit (WLL) tags of the lifting equipment and gear and calculate the deration of the WLL resulting from the slinging techniques applied
- make temporary connections to loads using fibre or synthetic ropes
- use radio communication and hand and whistle signals to guide the crane operator, including when the load is out of sight of the crane operator.

The candidate must use the following bends and hitches when slinging and directing the movement of loads:

- single sheet bend
- clove hitch

- rolling hitch
- bowline.

Load types must include:

- stillage containing at least ten scaffolding standards or loose steel pipes of 200 kg or more
- ten loose steel pipes, of at least 2 m length, that need wrapping
- an uneven load of at least two tonnes requiring slinging
- steel plate of at least 1.5 m x 2 m x 25 mm
- a round load with a minimum diameter of 300 mm and minimum length of 3 m.

The candidate must direct each load through at least 180 degrees of the crane's slewing radius.

Each of the following must be used at least once:

- flexible steel wire rope (FSWR) sling
- synthetic sling
- chain sling (including shortener)
- spreader bar or lifting beam
- tag line
- shackles
- eyebolts
- plate clamps.

Knowledge Evidence

To be competent in this unit, a candidate must demonstrate knowledge of:

- safe work requirements for dogging under Commonwealth and state or territory work health and safety (WHS) legislation, standards and codes of practice
- workplace information, including legislative requirements covered by:
  - SWMSs
  - permits and certifications
  - information about equipment:
    - service and maintenance checklists and records
    - manufacturer specifications and manuals
  - workplace procedures, including emergency plans and incident reporting
- hazard identification and mitigation strategies, including the hierarchy of control:
  - elimination
  - substitution
  - isolation
  - engineering controls
  - administrative controls
  - use of personal protective equipment (PPE)
- hazards commonly encountered in dogging:

  - instability of landing surfaces
  - overhead and underground hazards
  - insufficient lighting
  - traffic
  - weather
  - pedestrian traffic
  - work at heights
- risk controls and equipment:
  - traffic management plan
  - traffic barricades and control
  - exclusion zones
  - pedestrian barricades
  - PPE
  - lights
  - fall prevention and fall arrest equipment
- PPE:
  - hard hat
  - safety boots
  - gloves
  - high-visibility clothing
  - breathing, hearing, sight and skin and sun protection
- hand, whistle and two-way radio communication, including signals for:
  - stop
  - hoist up and down
  - luff boom up and down
  - telescope in and out
  - slew left and right
- selection, inspection, care, handling, application, limitations and storage of dogging equipment and gear:
  - (FSWR sling
  - synthetic sling
  - chain sling (including shortener)
  - spreader bar or lifting beam
  - tag line
  - shackles
  - eyebolts
  - plate clamps
- slinging techniques
- load destination stability, load capacity and safe access for walking and unpacking the load:

  - ground
  - loading platforms
  - suspended floors
  - vehicles
- mathematical processes for calculating deration of WLL of lifting equipment and gear due to slinging techniques
- methods of making temporary connections to loads using fibre and synthetic ropes:
  - single sheet bend
  - clove hitch
  - rolling hitch
  - bowline.

Assessment Conditions

Assessors must meet the requirements for assessors outlined in the Standards for Registered Training Organisations.

Only assessors who are accredited in the licence class by the appropriate WHS regulator for the jurisdiction governing the licence are permitted to conduct the final high-risk work licence assessment. The final licence assessment will only be undertaken with candidates who have completed training and been formally assessed against all elements in this unit.

Assessment must be conducted in the workplace or in a simulated workplace environment using realistic workplace conditions, materials, activities, responsibilities, procedures, safety requirements and environmental considerations, including:

- the use of full-scale, industry-standard equipment, not simulators
- performance of tasks within the timelines expected in a workplace.

Candidates must have access to:

- a slewing mobile crane of at least seven tonnes maximum rated capacity, and lifting equipment and gear in a safe and compliant condition
- loads and equipment required to perform the tasks specified in the Performance Evidence
- a licensed crane operator to undertake lifting activity
- workplace information and records, including:
  - equipment and maintenance checklists
  - record system for service and maintenance history
  - incident reports
  - workplace procedures, including emergency plan
  - equipment manuals and manufacturer specifications.

Links

Companion volumes to this training package are available at the VETNet website - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

CPCCLRG3001 Licence to perform rigging basic level

Modification History

Release 1 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.0.

Supersedes and is equivalent to CPCCLRG3001A Licence to perform rigging basic level. Updated to meet the Standards for Training Packages 2012.

Application

This unit specifies the skills and knowledge required to safely perform basic rigging work.

Riggers use mechanical load shifting equipment and associated gear to move, place or secure loads, including plant, equipment or members of a structure. Riggers ensure the stability of those members and set up and dismantle hoists.

This unit applies to rigging work involving:

- structural steel erection
- hoists
- pre-cast concrete members of a structure
- safety nets and static lines
- mast climbing work platforms
- perimeter safety screens and shutters
- cantilevered crane loading platforms.

Rigging work is undertaken in construction and other industries where load shifting equipment is used to move, place or secure loads.

Completion of the general construction induction training program, specified in the Safe Work Australia model *Code of Practice: Construction Work*, is required by anyone carrying out construction work. Achievement of CPCCWHS1001 *Prepare to work safely in the construction industry* meets this requirement.

Competence in this unit does not in itself result in a licence. A licence is obtained after competence is assessed under applicable Commonwealth, state or territory work health and safety (WHS) regulations.

Pre-requisite Unit

CPCCLDG3001 Licence to perform dogging

Unit Sector

Licencing

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe what needs to be done to demonstrate achievement of the element.
1 Plan task.	1.1 Review task instructions, consult with relevant persons to seek clarification as required, and obtain relevant workplace information.
	1.2 Obtain and interpret information, including safe work method statements (SWMSs), required to ensure that activities are performed in compliance with workplace-specific and safe work requirements.
	1.3 Obtain and interpret information required to ensure that equipment inspection, use, maintenance and storage complies with manufacturer requirements.
	1.4 Identify workplace and task-specific hazards and determine required risk controls and safety measures and equipment, including signs and barricades, personal protective equipment (PPE), and fall prevention and fall arrest equipment.
	1.5 Identify methods of moving and placing tools, equipment and materials to minimise the risk of falling objects, to avoid inappropriate carrying on ladders and to minimise hazardous manual tasks.
	1.6 Identify required rigging equipment and associated gear.
	1.7 Calculate loads associated with mechanical load shifting equipment and associated gear required to erect and dismantle structures and plant.
	1.8 Establish required communication methods with relevant persons.
2 Select and inspect equipment.	2.1 Select risk controls and equipment, including fall prevention and fall arrest equipment, and check that it is working and fit for purpose.
	2.2 Select and check PPE.

	2.3	Select rigging equipment and associated gear, inspect for defects, and isolate, tag out, report and record defective items.
	2.4	Select communication equipment and check that it is working and fit for use.
3 Set up task.	3.1	Establish and maintain communication with relevant persons to ensure task plan and risk controls are communicated clearly, including any impact on other workplace activities.
	3.2	Ensure risk controls and safety measures and equipment have been put in place, including the fitting, adjusting and anchoring of fall protection equipment.
	3.3	Consult with relevant persons to ensure that ground and foundation have been assessed as suitable for task.
	3.4	Consult with relevant persons to ensure that the structure has been assessed as suitable for load bearing task.
4 Undertake basic rigging activities.	4.1	Erect and dismantle all structures and plant while maintaining stability, in accordance with workplace and manufacturer requirements.
	4.2	Erect structural steel.
	4.3	Erect pre-cast concrete members of a structure, or lift and install a series of scenery panels.
	4.4	Erect and dismantle a safety net and static line.
	4.5	Erect and dismantle a hoist or mast climbing work platform.
	4.6	Install and dismantle a perimeter safety screen or shutter.
	4.7	Install and dismantle a cantilevered crane loading platform.
5 Complete task.	5.1	Remove excess materials from work area.
	5.2	Inspect structures, plant, equipment and gear for defects,

and isolate, tag out and report defective items.

5.3 Store plant, equipment and gear in accordance with workplace requirements.

5.4 Remove risk controls and safety measures and equipment.

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

Supersedes and is equivalent to CPCCLRG3001A Licence to perform rigging basic level.

Links

Companion volumes to this training package are available at the VETNet website - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

Assessment Requirements for CPCCLRG3001 Licence to perform rigging basic level

Modification History

Release 1 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.0.

Supersedes and is equivalent to CPCCLRG3001A Licence to perform rigging basic level. Updated to meet the Standards for Training Packages 2012.

Performance Evidence

To demonstrate competency in this unit, a candidate must meet the elements and performance criteria by safely performing rigging tasks at a basic level, including:

- erecting and dismantling a portal frame of structural steel consisting of columns (150 UC 29.8 kg/m), beams (minimum 200 UB 29.8 kg/m) and braces in accordance with engineering detail. It must include:
  - appropriate structural bolts, nuts, washers, purlins and girts
  - beams installed at a height of at least 4 m
  - suitable access and working platform (e.g. elevated work platform, mobile scaffold, scissor lift, portable industrial grade ladder)

It must be packed and plumbed and include temporary bracing during erection and dismantling. Hand tools and working at height safety equipment, including harness, lanyard and inertia reel, must be used

- installing and removing a series of three retaining wall panels, each panel being not less than 4 m high by 2 m wide and not less than 1.5 tonnes. One panel must be set at a 90-degree angle to one of the other panels - candidates must identify any defective lifting equipment
- installing and removing a safety (catch) net with minimum dimensions of 3 m x 4 m in accordance with manufacturer specification and engineering detail on portal frame - candidates must identify any defective nets
- installing, using and removing a static line at least 2.1 m above the beams on portal frame, in accordance with manufacturer specifications and engineering detail – candidates must identify any defective static lines and associated equipment
- installing and removing a cantilevered materials hoist (1 or 2 barrow) or a mast climbing work platform of at least three mast sections and tied in accordance with specifications
- installing and dismantling a perimeter safety screen or shutter of at least 4 m x 2 m in accordance with manufacturer specifications and engineering detail
- installing and dismantling a cantilevered crane loading platform at a height of at least 4 m with secure gates and handrails in accordance with manufacturer specifications and engineering detail

- setting up and operating a powered winch to move a load of at least 1 tonne
- using the following splice and hitch techniques:
  - eye splice
  - becket hitch.

The candidate must:

- check relevant workplace information, including safe work method statements (SWMSs) and equipment service and maintenance records and checklists
- perform all activities in compliance with workplace-specific, safe work and manufacturer requirements
- use the following associated gear:
  - beam clamps or pipe clamps or plate clamps
  - tag lines
  - flexible steel wire rope (FSWR)
  - chains
  - wire and synthetic slings
  - shackles
  - wedge sockets
  - eye bolts
  - rope grips
  - turnbuckles
  - chain blocks
  - sheave blocks
  - spreader bars or lifting beam
  - levers/podgers
  - skates/rollers
  - wedges
  - props
  - powered winches
  - snatch blocks
  - wire rope winches
  - lever pull (e.g. come-alongs)
- identify hazards and use appropriate risk controls and safety measures and equipment
- safely erect and dismantle structures and plant.

Knowledge Evidence

To be competent in this unit, a candidate must demonstrate knowledge of:

- safe work requirements for rigging under Australian Standards and Commonwealth and state or territory work health and safety (WHS) legislation, regulations, standards and codes of practice
- workplace information, including legislative requirements covered by:

    - SWMSs
    - permits and certifications
    - information about equipment:
        - service and maintenance checklists and records
        - manufacturer and supplier specifications and manuals
    - workplace procedures, including emergency plans and incident reporting
- hazard identification and mitigation strategies, including the hierarchy of control:
    - elimination
    - substitution
    - isolation
    - engineering controls
    - administrative controls
    - use of personal protective equipment (PPE)
- hazards commonly encountered in rigging basic level:
    - instability of work areas
    - damaged or poor-quality equipment
    - overhead and underground hazards
    - electrical items
    - mobile plant
    - insufficient lighting
    - wind and other adverse weather conditions
    - traffic
    - pedestrian traffic
    - hazardous manual tasks
    - falling objects
    - falls from heights
- minimum clearance distance from powerlines or electrical equipment specific to mobile plant and scaffolding and other structures as determined by relevant state or territory authority or electrical supply authority
- risk controls and equipment:
    - traffic control
    - pedestrian barricades
    - PPE
    - adequate illumination
    - safety structures and screens
- inspection, handling and storage of rigging structures and equipment, associated gear, and other required equipment:
    - rigging structures and equipment:
        - elevated work platforms
        - cantilevered crane loading platforms

    - portal frames
    - hoists
    - pre-cast concrete members
    - mast climbing work platform
    - safety screens and shutters
    - safety nets
- associated gear:
    - power and manually operated lifting gear
    - lifting clutches
    - tag lines
    - FSWR
    - chains
    - wire and synthetic slings
    - shackles
    - terminations
    - wedge sockets
    - eye bolts
    - beam clamps
    - pipe clamps
    - plate clamps
    - rope grips
    - turnbuckles
    - chain blocks
    - lever blocks
    - lever-action winches
    - sheaves
    - spreader bars
    - lifting beams
    - jacks
    - levers
    - skates
    - wedges
    - rollers
    - beam trolley
    - props
- safety equipment:
    - full-body safety harness
    - energy absorber
    - lanyard
    - inertia reel (fall arrester)

    - static safety lines
  - PPE:
    - hard hat
    - safety boots
    - gloves
    - high-visibility clothing
    - breathing, hearing, sight, skin and sun protection
  - communication equipment:
    - two-way radios
    - whistles
- relevant persons:
  - doggers
  - riggers
  - crane operators
  - engineers
  - supervisors
- ground and foundation suitability:
  - rough, uneven ground
  - backfilled ground
  - soft soils
  - hard compacted soil
  - rock
  - bitumen
  - concrete
  - suspended concrete floors
  - building roofs
  - landings
  - ground bearing pressure
- mathematical processes for estimating and measuring loads for basic rigging
- techniques for making temporary connections.

Assessment Conditions

Assessors must meet the requirements for assessors outlined in the Standards for Registered Training Organisations.

Only assessors who are accredited in the licence class by the appropriate WHS regulator for the jurisdiction where the licence is obtained are permitted to conduct the final high-risk work licence assessment. The final licence assessment will only be undertaken with candidates who have completed training and been formally assessed against all elements in this unit.

Assessment must be conducted in the workplace or in a simulated workplace environment using realistic workplace conditions, materials, activities, responsibilities, procedures, safety requirements and environmental considerations, including:

- the use of full-scale, industry-standard equipment, not simulators
- performance of tasks within the timelines expected in a workplace
- participation of the candidate in activities within a team of three to five members.

Candidates must have access to:

- all personnel and equipment required to perform the tasks specified in the Performance Evidence
- workplace information and records, including:
  - equipment and maintenance checklists
  - record system for service and maintenance history
  - incident reports
  - workplace procedures, including SWMSs and emergency plans
  - equipment manuals and manufacturer specifications
  - relevant plant supplier information.

Links

Companion volumes to this training package are available at the VETNet website - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

CPCCLRG3002 Licence to perform rigging intermediate level

Modification History

Release 1 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.0.

Supersedes and is equivalent to CPCCLRG3002A Licence to perform rigging intermediate level. Updated to meet the Standards for Training Packages 2012.

Application

This unit specifies the skills and knowledge required to safely perform intermediate rigging work.

Riggers use mechanical load shifting equipment and associated gear to move, place or secure loads, including plant, equipment or members of a building or structure. Riggers ensure the stability of those members and set up and dismantle cranes and hoists.

This unit includes rigging work involving:

- hoists with jibs and self-climbing hoists
- cranes, conveyors, dredges and excavators
- tilt slabs
- demolition of structures or plant
- multiple lifts.

Rigging work is undertaken in construction and other industries where load shifting equipment is used to move, place or secure loads.

Completion of the general construction induction training program, specified in the Safe Work Australia model Code of Practice: Construction Work, is required by anyone carrying out construction work. Achievement of CPCCWHS1001 Prepare to work safely in the construction industry meets this requirement.

Competence in this unit does not in itself result in a licence. A licence is obtained after competence is assessed under applicable Commonwealth, state or territory work health and safety (WHS) regulations.

Pre-requisite Unit

CPCCLRG3001 Licence to perform rigging basic level

Unit Sector

Licencing

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe what needs to be done to demonstrate achievement of the element.
1 Plan task.	1.1 Review task instructions, consult with relevant persons to seek clarification as required, and obtain relevant workplace information.
	1.2 Obtain and interpret information, including safe work method statements (SWMSs), required to ensure that activities are performed in compliance with workplace-specific and safe work requirements.
	1.3 Obtain and interpret information required to ensure that equipment inspection, use, maintenance and storage complies with manufacturer requirements.
	1.4 Identify workplace and task-specific hazards and determine required risk controls and safety measures and equipment, including signs and barricades, personal protective equipment (PPE), and fall prevention and fall arrest equipment.
	1.5 Identify methods of moving and placing tools, equipment and materials to minimise the risk of falling objects, to avoid inappropriate carrying on ladders and to minimise hazardous manual tasks.
	1.6 Identify required rigging equipment and associated gear.
	1.7 Calculate loads associated with mechanical load shifting equipment and associated gear required to erect and dismantle structures and plant.
	1.8 Establish required communication methods with relevant persons.
2 Select and inspect equipment.	2.1 Select risk controls and equipment, including fall prevention and fall arrest equipment, and check that it is working and fit for purpose.
	2.2 Select and check PPE.
	2.3 Select rigging equipment and associated gear, inspect for defects, and isolate, tag out, report and record defective items.

	2.4	Select communication equipment and check that it is working and fit for use.
3 Set up task.	3.1	Establish and maintain communication with relevant persons to ensure task plan and risk controls are communicated clearly, including any impact on other workplace activities.
	3.2	Ensure risk controls and safety measures and equipment have been put in place, including the fitting, adjusting and anchoring of fall protection equipment.
	3.3	Consult with relevant persons to ensure that ground and foundation have been assessed as suitable for task.
	3.4	Consult with relevant persons to ensure that the structure has been assessed as suitable for load bearing task.
4 Undertake intermediate rigging activities.	4.1	Erect and dismantle all structures and operate plant while maintaining stability, in accordance with workplace and manufacturer requirements.
	4.2	Conduct a multiple-crane lift.
	4.3	Erect and dismantle a tower crane section or a crane lattice boom section.
	4.4	Lift and install a series of tilt-up concrete panels.
	4.5	Remove a concrete-encased structural steel column and beam.
5 Complete task.	5.1	Remove excess materials from work area.
	5.2	Inspect structures, plant, equipment and gear for defects, and isolate, tag out and report defective items.
	5.3	Store plant, equipment and gear in accordance with workplace requirements.
	5.4	Remove risk controls and safety measures and equipment.

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

Supersedes and is equivalent to CPCCLRG3002A Licence to perform rigging intermediate level.

Links

Companion volumes to this training package are available at the VETNet website - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

Assessment Requirements for CPCCLRG3002 Licence to perform rigging intermediate level

Modification History

Release 1 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.0.

Supersedes and is equivalent to CPCCLRG3002A Licence to perform rigging intermediate level. Updated to meet the Standards for Training Packages 2012.

Performance Evidence

To demonstrate competency in this unit, a candidate must meet the elements and performance criteria by safely performing rigging tasks at an intermediate level, including:

- undertaking a multiple-crane lift of a load of at least 1 tonne and at least 4 m long
- one of the following:
  - adding and removing a tower crane section, or
  - adding and removing a crane lattice boom section, or
  - adding and removing a fly jib on a slewing mobile crane, or
  - erecting and dismantling a non-guyed tower
- installing and removing a three-panel structure, with each panel being at least 4 m high, at least 2 m wide and at least 1.5 tonnes
- using the following bends and hitches:
  - round turn
  - two half-hitches.

The candidate must:

- check relevant workplace information, including safe work method statements (SWMSs) and equipment service and maintenance records and checklists
- perform all activities in compliance with workplace-specific, safe work and manufacturer requirements
- identify hazards and use appropriate risk controls and safety measures and equipment
- use the following associated gear:
  - tag lines
  - flexible steel wire rope (FSWR)
  - chains
  - wire and synthetic slings
  - shackles
  - wedge sockets

  - eye bolts
  - rope grips
  - turnbuckles
  - chain blocks
  - sheaves
  - spreader bars or lifting beams
  - snatch blocks
  - lifting clutches
- safely erect and dismantle structures and plant.

Knowledge Evidence

To be competent in this unit, a candidate must demonstrate knowledge of:

- safe work requirements for rigging under Australian Standards, and Commonwealth and state or territory work health and safety (WHS) legislation, regulations, standards and codes of practice
- workplace information, including legislative requirements covered by:
  - SWMSs
  - permits and certifications
  - information about equipment:
    - service and maintenance checklists and records
    - manufacturer and supplier specifications and manuals
  - workplace procedures, including emergency plans and incident reporting
- hazard identification and mitigation strategies, including the hierarchy of control:
  - elimination
  - substitution
  - isolation
  - engineering controls
  - administrative controls
  - use of personal protective equipment (PPE)
- hazards commonly encountered in rigging intermediate level:
  - instability of work areas
  - damaged or poor-quality equipment
  - overhead and underground hazards
  - electrical items
  - mobile plant
  - insufficient lighting
  - wind and other adverse weather conditions
  - traffic
  - pedestrian traffic

    - hazardous manual tasks
    - falling objects
    - falls from heights
- minimum clearance distance from powerlines or electrical equipment specific to mobile plant and scaffolding as determined by relevant state or territory authority or electrical supply authority
- risk controls and equipment:
    - traffic barricades and control
    - pedestrian barricades
    - PPE
    - adequate illumination
    - safety structures and screens
    - exclusion zones
- inspection, handling and storage of rigging structures and equipment, associated gear, and other required equipment:
    - rigging structures and equipment:
        - concrete tilt-up panels
        - non-guyed light towers
        - scaffolds
        - elevated work platforms
        - personnel box
        - cantilevered crane loading platforms
        - mast climbers
        - safety screens and shutters
        - cranes
    - associated gear:
        - power and manually operated lifting gear
        - lifting clutches
        - snatch blocks
        - tag lines
        - FSWR
        - chains
        - wire and synthetic slings
        - shackles
        - terminations
        - wedge sockets
        - eye bolts
        - beam clamps
        - pipe clamps
        - plate clamps

        - wire rope grips
        - turnbuckles
        - rigging screws
        - chain blocks
        - lever blocks
        - lever-action winches
        - sheaves
        - spreader bars
        - lifting beams
        - jacks
        - levers
        - skates
        - wedges
        - rollers
        - beam trolley
    - safety equipment:
        - safety harness
        - energy absorber
        - lanyard
        - inertia reel
        - static safety lines
    - PPE:
        - hard hat
        - safety boots
        - gloves
        - high-visibility clothing
        - breathing, hearing, sight, skin and sun protection
    - communication equipment:
        - two-way radios
        - whistles
- relevant persons:
    - doggers
    - riggers
    - load-shifting plant operators
    - engineers
    - supervisors
- ground and foundation suitability:
    - rough, uneven ground
    - backfilled ground
    - soft soils

  - hard compacted soil
  - rock
  - bitumen
  - concrete
  - suspended concrete floors
  - building roofs
  - landings
  - ground bearing pressure
- mathematical processes for estimating and measuring forces and loads for intermediate rigging
- techniques for making temporary connections by tying bends and hitches:
  - round turn
  - two half-hitches.

Assessment Conditions

Assessors must meet the requirements for assessors outlined in the Standards for Registered Training Organisations.

Only assessors who are accredited in the licence class by the appropriate WHS regulator for the jurisdiction where the licence is obtained are permitted to conduct the final high-risk work licence assessment. The final licence assessment will only be undertaken with candidates who have completed training and been formally assessed against all elements in this unit.

Assessment must be conducted in the workplace or in a simulated workplace environment using realistic workplace conditions, materials, activities, responsibilities, procedures, safety requirements and environmental considerations, including:

- the use of full-scale, industry-standard equipment, not simulators
- performance of tasks within the timelines expected in a workplace
- participation of the candidate in activities within a team of three to five members.

Candidates must have access to:

- all personnel and equipment required to perform the tasks specified in the Performance Evidence
- workplace information and records, including:
  - equipment and maintenance checklists
  - record system for service and maintenance history
  - incident reports
  - workplace procedures, including SWMSs and emergency plans
  - equipment manuals and manufacturer specifications
  - relevant plant supplier information.

Links

Companion volumes to this training package are available at the VETNet website - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

CPCCLRG4001 Licence to perform rigging advanced level

Modification History

Release 1 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.0.

Supersedes and is equivalent to CPCCLRG4001A Licence to perform rigging advanced level. Updated to meet the Standards for Training Packages 2012.

Application

This unit specifies the skills and knowledge required to safely perform advanced rigging work.

Riggers use mechanical load shifting equipment and associated gear to move, place or secure loads, including plant, equipment or members of a building or structure. Riggers ensure the stability of those members and set up and dismantle cranes and hoists.

This unit applies to rigging work involving:

- gin poles and shear legs
- flying foxes and cable ways
- guyed derricks and structures
- suspended scaffolds and fabricated hung scaffolds.

Rigging work is undertaken in construction and other industries where load shifting equipment is used to move, place or secure loads.

Completion of the general construction induction training program, specified in the Safe Work Australia model *Code of Practice: Construction Work*, is required by anyone carrying out construction work. Achievement of *CPCCWHS1001 Prepare to work safely in the construction industry* meets this requirement.

Competence in this unit does not in itself result in a licence. A licence is obtained after competence is assessed under applicable Commonwealth, state or territory work health and safety (WHS) regulations.

Pre-requisite Unit

CPCCLRG3002 Licence to perform rigging intermediate level

Unit Sector

Licencing

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe what needs to be done to demonstrate achievement of the element.
1 Plan task.	1.1 Review task instructions, consult with relevant persons to seek clarification as required, and obtain relevant workplace information.
	1.2 Obtain and interpret information, including safe work method statements (SWMSs), required to ensure that activities are performed in compliance with workplace-specific and safe work requirements.
	1.3 Obtain and interpret information required to ensure that equipment inspection, use, maintenance and storage complies with manufacturer requirements.
	1.4 Identify workplace and task-specific hazards and determine required risk controls and safety measures and equipment, including signs and barricades, personal protective equipment (PPE), and fall prevention and fall arrest equipment.
	1.5 Identify methods of moving and placing tools, equipment and materials to minimise the risk of falling objects, to avoid inappropriate carrying on ladders and to minimise hazardous manual tasks.
	1.6 Identify required rigging equipment and associated gear.
	1.7 Calculate loads associated with mechanical load shifting equipment and associated gear required to erect and dismantle structures and plant.
	1.8 Establish communication methods with associated personnel.
2 Select and inspect equipment.	2.1 Select risk controls and equipment, including fall prevention and fall arrest equipment, and check that it is working and fit for purpose.
	2.2 Select and check PPE.
	2.3 Select rigging equipment and associated gear, inspect for defects, and isolate, tag out, report and record defective items.

	2.4	Select communication equipment and check that it is working and fit for use.
3 Set up task.	3.1	Establish and maintain communication with relevant persons to ensure task plan and risk controls are communicated clearly, including any impact on other workplace activities.
	3.2	Ensure risk controls and safety measures and equipment have been put in place, including the fitting, adjusting and anchoring of fall protection equipment.
	3.3	Consult with relevant persons to ensure that ground and foundation have been assessed as suitable for task.
	3.4	Consult with relevant persons to ensure that the structure has been assessed as suitable for load bearing task.
4 Undertake advanced rigging activities.	4.1	Erect, operate and dismantle all structures and plant while maintaining stability, in accordance with workplace and manufacturer requirements.
	4.2	Erect gin poles or sheer legs, operate winch to move load, and dismantle.
	4.3	Erect flying fox or cable way, operate to move a load, and dismantle.
	4.4	Erect guyed derrick, operate to move a load, and dismantle.
	4.5	Erect, operate and dismantle suspended scaffold.
	4.6	Install and remove fabricated hung scaffold.
5 Complete task.	5.1	Remove excess materials from work area.
	5.2	Inspect structures, plant, equipment and gear for defects, and isolate, tag out and report defective items.
	5.3	Store plant, equipment and gear in accordance with workplace requirements.
	5.4	Remove risk controls safety measures and equipment.

5.5 Complete handover certificates, and attach scaffolding tags for suspended scaffold and hung scaffold.

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

Supersedes and is equivalent to CPCCLRG4001A Licence to perform rigging advanced level.

Links

Companion volumes to this training package are available at the VETNet website - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

Assessment Requirements for CPCCLRG4001 Licence to perform rigging advanced level

Modification History

Release 1 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.0.

Supersedes and is equivalent to CPCCLRG4001A Licence to perform rigging advanced level. Updated to meet the Standards for Training Packages 2012

Performance Evidence

To demonstrate competency in this unit, a candidate must meet the elements and performance criteria by erecting, using and dismantling the following:

- gin pole or shear leg of a height of 8 m or more and a working load limit of 400 kg or more. The winch must be powered with at least one diversion sheave
- a flying fox or cable way of a height of at least 4 m and a span distance of at least 10 m and able to support at least 200 kg - the rope span may be supported from fixed anchorages, poles, or both
- guyed derricks and structures of a minimum height of 8 m
- a suspended scaffold of a height of at least 4 m with a minimum capacity of at least 200 kg attached by a dual needle system using counterweights and powered winch
- a fabricated hung scaffold of at least 4 m height and 3.4 m length, and consisting of one continuous platform of heavy-duty capacity.

The candidate must:

- check relevant workplace information, including safe work method statements (SWMSs) and equipment service and maintenance records and checklists
- perform all activities in compliance with workplace-specific, safe work and manufacturer requirements, including the completion of required handover certificates
- identify hazards and use appropriate risk controls and safety measures and equipment
- use all the associated gear listed under Knowledge Evidence
- safely erect, use and dismantle structures and plant.

Knowledge Evidence

To be competent in this unit, a candidate must demonstrate knowledge of:

- safe work requirements for rigging under Australian Standards, and Commonwealth and state or territory work health and safety (WHS) legislation, regulations and codes of practice
- workplace information, including legislative requirements covered by:

    - SWMSs
    - permits and certifications
    - information about equipment:
        - service and maintenance checklists and records
        - manufacturer and supplier specifications and manuals
    - workplace procedures, including emergency plans and incident reporting
- hazard identification and mitigation strategies, including the hierarchy of control:
    - elimination
    - substitution
    - isolation
    - engineering controls
    - administrative controls
    - use of personal protective equipment (PPE)
- hazards commonly encountered in rigging advanced level:
    - instability of work areas
    - damaged or poor-quality equipment
    - overhead and underground hazards
    - electrical items
    - mobile plant
    - insufficient lighting
    - wind and other adverse weather conditions
    - traffic
    - pedestrian traffic
    - hazardous manual tasks
    - falling objects
    - falls from heights
- minimum clearance distance from powerlines or electrical equipment specific to mobile plant and scaffolding as determined by relevant state or territory authority or electrical supply authority
- risk controls and equipment:
    - traffic barricades and control
    - pedestrian barricades
    - PPE:
        - hard hat
        - safety boots
        - gloves
        - high-visibility clothing
        - breathing, hearing, sight, skin and sun protection
    - adequate illumination
    - safety structures and screens

- inspection, handling and storage of rigging structures and equipment, associated gear, and other required equipment:
  - rigging structures and equipment:
    - gin poles
    - flying foxes
    - shear legs
    - cable ways
    - guyed derricks
    - suspended scaffolds
    - fabricated hung scaffolds
  - associated gear:
    - power and manually operated lifting gear
    - tag lines
    - flexible steel wire rope (FSWR)
    - chains
    - wire and synthetic slings
    - shackles
    - terminations
    - eye bolts
    - beam clamps
    - rope grips
    - turnbuckles
    - rigging screws
    - lever blocks
    - lever-action winches
    - sheaves
    - scaffold and rigging tools
    - jacks
    - levers
    - skates
    - wedges
    - rollers
    - girder trolley
  - safety equipment:
    - safety harness
    - energy absorber
    - lanyard
    - inertia reel
    - static safety lines
  - communication equipment:

    - two-way radios
    - whistles
  - associated personnel:
    - doggers
    - riggers
    - crane operators
    - engineers
    - supervisors
- ground and foundation suitability:
  - rough, uneven ground
  - backfilled ground
  - soft soils
  - hard compacted soil
  - rock
  - bitumen
  - concrete
  - suspended concrete floors
  - building roofs
  - landings
  - ground bearing pressure
- supporting beams or structures load bearing capacity
- mathematical processes for calculating loads for advanced rigging.

Assessment Conditions

Assessors must meet the requirements for assessors outlined in the Standards for Registered Training Organisations.

Only assessors who are accredited in the licence class by the appropriate WHS regulator for the jurisdiction where the licence is obtained are permitted to conduct the final high-risk work licence assessment. The final licence assessment will only be undertaken with candidates who have completed training and been formally assessed against all elements in this unit.

Assessment must be conducted in the workplace or in a simulated workplace environment using realistic workplace conditions, materials, activities, responsibilities, procedures, safety requirements and environmental considerations, including:

- the use of full-scale, industry-standard equipment, not simulators
- performance of tasks within the timelines expected in a workplace.
- participation of the candidate in activities within a team of three to five members.

Candidates must have access to:

- all personnel and equipment required to perform the tasks specified in the Performance Evidence
- workplace information and records, including:

- equipment and maintenance checklists
- record system for service and maintenance history
- incident reports
- workplace procedures, including SWMSs and emergency plans
- equipment manuals and manufacturer specifications
- relevant plant supplier information.

Links

Companion volumes to this training package are available at the VETNet website - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

FWPHAR2208 Operate a mobile chipper/mulcher

Modification History

Release	Comments
Release 1	This version released with FWP Forest and Wood Products Training Package Version 6.0.

Application

This unit of competency describes the skills and knowledge required to operate a hand-fed or machine-fed mobile chipping or mulching unit to chip or mulch timber refuse such as branches and other timber waste.

The unit applies to individuals who operate mobile chippers/mulchers as part of arboriculture, forestry, agriculture, conservation and land management, local government, emergency services and other government agency operations.

All work must be carried out to comply with workplace procedures, according to state/territory health and safety regulations, legislation and standards that apply to the workplace.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Unit Sector

Harvesting and Haulage (HAR)

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare for chipping or mulching	1.1 Determine job requirements from work order or instruction and, where required, seek clarification from appropriate personnel 1.2 Confirm safety and environmental protection requirements for the

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	task according to workplace procedures 1.3 Identify, assess and take actions to mitigate risks and hazards associated with operating mobile chippers/mulchers 1.4 Identify type and quantity of material to be chipped or mulched 1.5 Plan chipping/mulching activities according to work order or instruction and environmental conditions 1.6 Consult and maintain communication with team members and other appropriate personnel to ensure that work is coordinated effectively with others in the workplace 1.7 Select, fit and use personal protective equipment 1.8 Obtain tools and equipment needed for the work, and check for correct operation and safety
2. Chip or mulch material	2.1 Reject material assessed as unsuitable for chipping or mulching, and dispose of or recycle according to workplace and environmental protection practices 2.2 Use equipment according to workplace safety procedures, manufacturer instructions and environmental protection requirements 2.3 Position, secure and set up chipping and mulching unit according to manufacturer specifications and required size 2.4 Direct material into chipper or mulcher at rate applicable to machine capacity using safe methods for loading and feeding 2.5 Respond to critical situations requiring emergency shutdown to prevent personal injury or damage to machine or product 2.6 Direct chipped or mulched material onto stock pile or transport vehicle if required
3. Complete operator maintenance	3.1 Follow workplace safety procedures and manufacturer instructions to lock out equipment 3.2 Complete operational safety checks according to manufacturer recommendations 3.3 Check cutters for wear and damage as required or at intervals recommended by manufacturer 3.4 Check and replenish fuel and lubricants according to manufacturer recommendations 3.5 Clean and store chipper/mulcher 3.6 Record and report production outcomes and equipment faults to

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	appropriate personnel

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	• Interpret workplace documentation to determine requirements
Writing	• Use technical and workplace specific vocabulary to accurately and legibly complete workplace records and forms
Oral communication	• Ask questions and actively listen to clarify contents of work orders
Numeracy	• Identify quantities of required material within work orders • Interpret basic numerical machine settings, and choose according to chip size • Complete routine production records involving quantities tallied against orders

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
FWPHAR2208 Operate a mobile chipper/mulcher	FWPHAR2206 Operate a mobile chipper/mulcher	Clarified Application Updated and added new Performance Criteria Re-titled Element Added new knowledge items Updated Foundation Skills, Performance Evidence and Assessment	Equivalent

Code and title current version	Code and title previous version	Comments	Equivalence status
		Conditions	

Links

Companion Volumes, including Implementation Guides, are available at VETNet: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=0d96fe23-5747-4c01-9d6f-3509ff8d3d47

Assessment Requirements for FWPHAR2208 Operate a mobile chipper/mulcher

Modification History

Release	Comments
Release 1	This version released with FWP Forest and Wood Products Training Package Version 6.0.

Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit.

There must be evidence that the individual has:

- assessed, planned and conducted the chipping or mulching of two different species of material
- followed workplace policy and procedures and current workplace health and safety legislation, regulations and related industry standards and codes of practice applicable to wood chipping or mulching operations
- inspected and carried out routine operator maintenance on one mobile chipper/mulcher on one occasion according to manufacturer requirements.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- environmental protection practices related to wood chipping or mulching operations:
  - energy use
  - cleaning plant, tools and equipment
  - disposing of, recycling and reusing waste products
- types of material suitable and unsuitable for chipping and mulching
- types, purpose, features and operation of mobile chipping and mulching units
- capacity of chippers and mulchers to cope with differing sizes and diameters of branch
- feed rates at which material is fed into chippers and mulchers to optimise output without damaging or blocking machinery
- feeding techniques to minimise operator exposure to injury
- techniques for loading chipped/mulched material into truck or transport vehicle
- criteria and methods for checking cutting blade condition

- operator maintenance procedures for fuelling, safety checks, cleaning, lubricating, operational adjustments and cutter inspection for wear or damage, replacement and disposal
- common hazards associated with chipping and mulching operations and methods to minimise associated risks
- workplace procedures specific to chipping and mulching:
  - workplace health and safety, with particular emphasis on equipment lock-out, use of personal protective equipment (PPE) and safe manual handling
  - communication reporting lines
  - recording and reporting production outcomes and equipment faults.

Assessment Conditions

Assessment of the skills in this unit of competency must take place under the following conditions:

- physical conditions:
  - competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting
- resources, equipment and materials:
  - mobile chipper or mulcher
  - truck or transport vehicle suitable for transporting chipped/mulched material if required by site requirements
  - material to chip or mulch
  - PPE required in chipping and mulching operations
  - communication system
- specifications:
  - access to workplace safety and environmental protection policies and procedures applicable to chipping or mulching operations
  - access to workplace standard operating procedures or operator manual for mobile chippers or mulchers.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volumes, including Implementation Guides, are available at VETNet: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=0d96fe23-5747-4c01-9d6f-3509ff8d3d47

HLTAID009 Provide cardiopulmonary resuscitation

Modification History

Not applicable.

Application

This unit describes the skills and knowledge required to perform cardiopulmonary resuscitation (CPR) in line with the Australian Resuscitation Council (ARC) guidelines.

This unit applies to all persons who may be required to provide CPR, in a range of situations, including community and workplace settings.

Specific licensing/regulatory requirements relating to this competency, including requirements for refresher training should be obtained from the relevant national/state/territory Work Health and Safety Regulatory Authorities.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Respond to an emergency situation.	1.1. Recognise and assess an emergency situation. 1.2. Ensure safety for self, bystanders and casualty. 1.3. Assess the casualty and recognise the need for cardiopulmonary resuscitation (CPR). 1.4. Seek assistance from emergency services.
2. Perform CPR procedures.	2.1. Perform CPR in accordance with the ARC guidelines. 2.2. Display respectful behaviour towards casualty. 2.3. Operate an automated external defibrillator (AED) according to manufacturers' instructions.
3. Communicate details of the incident.	3.1. Accurately convey incident details to emergency services. 3.2. Report details of incident in line with appropriate workplace or site procedures. 3.3. Maintain privacy and confidentiality of information in line with statutory or organisational policies.

4. Review the incident.	4.1. Recognise the possible psychological impacts on self and other rescuers and seek help when required. 4.2. Contribute to a review of the first aid response as required.

Foundation Skills

The Foundation Skills describe those required skills (language, literacy, numeracy and employment skills) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

Supersedes and not equivalent to HLTAID001 Perform cardiopulmonary resuscitation

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ced1390f-48d9-4ab0-bd50-b015e5485705

Assessment Requirements for HLTAID009 Provide cardiopulmonary resuscitation

Modification History

Not applicable.

Performance Evidence

Evidence of the ability to complete tasks outlined in elements and performance criteria of this unit in the context of the workplace or community setting.

There must be evidence that the candidate has completed the following tasks in line with State/Territory regulations, first aid codes of practice, first aid guidelines determined by the Australian Resuscitation Council (ARC) and other Australian national peak clinical bodies and workplace or site procedures:

- managed, in line with ARC guidelines, the unconscious, breathing casualty including appropriate positioning to reduce the risk of airway compromise
- managed, in line with ARC guidelines, the unconscious, non-breathing adult, including:
  - performing at least 2 minutes of uninterrupted single rescuer cardiopulmonary resuscitation (CPR) (5 cycles of both compressions and ventilations) on an adult resuscitation manikin placed on the floor
  - following the prompts of an automated external defibrillator (AED) to deliver at least one shock
  - demonstrating a rotation of single rescuer operators with minimal interruptions to compressions
  - responding appropriately in the event of regurgitation or vomiting
  - handing over to emergency services
  - providing an accurate verbal report of the incident
  - reviewing the incident
- managed, in line with ARC guidelines, the unconscious, non-breathing infant, including:
  - performing at least 2 minutes of uninterrupted single rescuer CPR (5 cycles both compressions and ventilations) on an infant resuscitation manikin placed on a firm surface.

Knowledge Evidence

Demonstrated knowledge required to complete the tasks outlined in elements and performance criteria of this unit:

- guidelines and procedures including:
  - relevant ARC guidelines to managing the unconscious breathing and non-breathing casualty and provision of CPR
  - potential incident hazards and risk minimisation processes when providing first aid

    - infection control procedures, including use of standard precautions and resuscitation barrier devices
    - requirements for currency of skill and knowledge
    - first aid codes of practice
    - appropriate workplace or site procedures relevant to the provision of first aid
- legal, workplace and community considerations, including:
    - duty of care requirements
    - own skills and limitations
    - consent and how it relates to the conscious and unconscious casualty
    - privacy and confidentiality requirements
    - awareness of potential need for stress management techniques and available support for rescuers
- considerations when providing CPR, including:
    - upper airway and effect of positional change
    - appropriate duration and cessation of CPR
    - appropriate use of an AED
    - safety and maintenance procedures for an AED
    - chain of survival
    - how to access emergency services
- techniques for providing CPR to adults, children and infants including:
    - how to recognise that a casualty is unconscious and not breathing normally
    - rate, ratio and depth of compressions and ventilations
    - correct hand positioning for compressions
    - basic anatomy, physiology and the differences between adults, children and infants relating to CPR.

Assessment Conditions

Each candidate to demonstrate skills in an environment that provides realistic in-depth, scenarios and simulations to assess candidates' skills and knowledge.

Due to the nature of this type of training, it is acceptable for the performance evidence to be collected in a simulated environment.

Compression and ventilation skills must be demonstrated on resuscitation manikins following ARC guidelines for the purpose of assessment of CPR procedures.

Assessment must ensure access to:

- adult and infant resuscitation manikins following ARC guidelines for the purpose of assessment of CPR procedures
- AED training devices
- personal protective equipment (PPE).

Simulated assessment environments must simulate real-life situations where these skills and knowledge would be performed, with all the relevant equipment and resources of that workplace or community environment.

Assessors must satisfy the Standards for Registered Training Organisations' requirements for assessors and must hold this unit or demonstrate equivalent skills and knowledge to that contained within this unit.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ced1390f-48d9-4ab0-bd50-b015e5485705

ICTWHS202 Work safely in a radio frequency electromagnetic radiation environment

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the performance outcomes, skills and knowledge required to use organisational risk control procedures when working with a risk of exposure to radio frequency (RF) electromagnetic radiation (EMR) hazards.

The unit applies to site maintenance staff, technicians and installers who install or maintain equipment at installations that are sources of RF EMR.

Work functions in the occupational areas where this unit may be used are subject to regulatory requirements. Refer to the ICT Implementation Guide Companion Volume or the relevant regulator for details of licensing, legislative or certification requirements.

Unit Sector

Telecommunications – work health and safety

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare to work in RF EMR environment	1.1 Identify characteristics of RF EMR and situations that can lead to exposure to RF EMR hazards 1.2 Identify potential effects of RF EMR on human body and contributing factors that affect it 1.3 Research relevant regulations and standards that apply to

ELEMENT	PERFORMANCE CRITERIA
	working with and controlling RF EMR hazards 1.4 Obtain and review RF EMR information required for work environment
2. Assess RF EMR risks	2.1 Assess potential RF EMR hazards in telecommunications work environment 2.2 Estimate likely field strength pattern of potential RF EMR hazard
3. Control RF EMR risks	3.1 Explain typical organisational controls to manage and control identified RF EMR hazards 3.2 Choose and apply appropriate RF EMR controls 3.3 Report EMR exposure that exceeds acceptable levels according to organisational work health and safety (WHS) requirements

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.1-1.4, 2.1, 2.2, 3.1	• Uses a number of reading strategies to identify and interpret relevant information within familiar text types
Writing	3.3	• Prepares organisational WHS documentation using clear language, correct spelling and terminology
Oral Communication	3.3	• Uses clear language and concepts, and tone and pace appropriate for the audience and purpose
Numeracy	2.2	• Performs mathematical calculations to estimate, interpret and compare RF signal strength
Navigate the world of work	1.3, 1.4, 3.1-3.3	• Understands responsibility to comply with legal and regulatory requirements
Interact with others	3.3	• Identifies and takes steps to follow accepted communication practices and protocols
Get the work done	1.1-1.4, 2.1, 3.1, 3.2	• Follows clearly defined instructions and sequencing, and monitors own progress for the task, seeking assistance when necessary

		• Makes low-impact decisions within familiar situations, based on a range of predefined or routine solutions • Responds to predictable routine problems and implements standard or logical solutions

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
ICTWHS202 Work safely in a radio frequency electromagnetic radiation environment	ICTWHS2081A Work safely in a radio frequency electromagnetic radiation environment	Updated to meet Standards for Training Packages	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

Assessment Requirements for ICTWHS202 Work safely in a radio frequency electromagnetic radiation environment

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Performance Evidence

Evidence of the ability to:

- identify the effect of radio frequency (RF) electromagnetic radiation (EMR) on the human body
- locate, interpret and apply relevant information, standards and specifications for working safely with RF EMR
- identify organisational controls for exposure to RF EMR, including lock-out procedures and the use of personal protective equipment
- identify risks and safety requirements and record in a job safety analysis (JSA) sheet or safe work method statement (SWMS) or similar record sheet
- select and use appropriate processes, tools and equipment to minimise RF EMR risk
- comply with regulations, standards and organisational procedures and processes
- communicate and work effectively and safely with others.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- describe the characteristics of RF EMR and sources of RF EMR, and state their effect on the human body
- describe the nature of work undertaken close to sources of RF EMR and identify the associated risks and hazards
- identify and summarise the regulations and standards that govern the generation of RF and EMR
- identify the relevant statutory and regulatory requirements relating to working safely with RF EMR
- describe the organisational control processes for managing exposure to RF EMR.

Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances should be typical of those experienced in the telecommunications – work health and safety field of work and include access to:

- induction procedures and requirements
- relevant specifications and work instructions
- tools and equipment appropriate to applying safe work practices
- support materials appropriate to activity
- workplace instructions relating to safe work practices and addressing hazards and emergencies
- relevant regulations, standards, specifications and manuals, including industry related systems information.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

NWPCAD004 Maintain catchment and surrounding areas

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to maintain catchment and surrounding areas.

It includes maintaining surface catchment areas and associated rivers, lakes, water bodies, dams, water storages and groundwater areas whilst contributing to the maintenance of water quality, protection of the environment and public. It also includes maintaining environmental conditions, undertaking maintenance and reporting outcomes.

This unit applies to those working as field staff with specific responsibility for maintaining catchment and surrounding areas and contributing to catchment management and control. Those undertaking this unit would work under appropriate supervision either independently or in a team, while performing routine tasks in range of familiar contexts.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Catchment and Dams

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for work	**1.1** Access and review catchment records describing

			maintenance requirements for action
		1.2	Identify and follow work requirements and timelines for performing maintenance tasks of catchments and surrounding areas
		1.3	Assess site, equipment and methods for risks and apply appropriate control measures
		1.4	Plan maintenance work to be conducted within required timeframe, using allocated resources
2	**Maintain environmental condition of waterways and surrounding areas**	**2.1**	Remove and dispose of dead livestock or native fauna from waterways and surrounding catchments
		2.2	Remove flood debris from waterways and surrounding areas according to workplace procedures
		2.3	Carry out fuel reduction burns according to workplace procedures
		2.4	Apply control measures to contain or control chemical spills or contaminated water supplies
		2.5	Identify and report potential or emerging changes to environmental conditions to relevant personnel
		2.6	Identify procedures for responding to emergencies and providing security to the catchment area
3	**Eradicate noxious weeds and feral pests**	**3.1**	Identify and report noxious weeds and feral pests contributing to degradation of catchment and surrounding areas to relevant personnel
		3.2	Organise for the removal of noxious weeds and feral pests
		3.3	Identify and report observations outside defined parameters to relevant personnel for further action
		3.4	Compile reports on eradication process and submit to relevant personnel
		3.5	Monitor and report activities within the catchment area to relevant personnel
4	**Perform maintenance within catchment area**	**4.1**	Identify and inspect infrastructure requiring minor maintenance

4.2 Apply erosion control measures for waterways and surrounding areas

4.3 Make repairs using appropriate tools, equipment and resources according to workplace procedures

4.4 Record and report maintenance performed to relevant personnel

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPSOU011 Maintain catchment and surrounding areas.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPCAD004 Maintain catchment and surrounding areas

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- compiling reports
- controlling pests
- identifying and responding to maintenance problems
- inspecting catchment and surrounds
- interpreting work requirements
- monitoring and reporting environmental conditions
- performing minor maintenance tasks
- removing debris, noxious weeds

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- catchment emergency response and catchment security procedures
- effects of weather and conditions on operation of site or plant
- environmental, landscape and ground structure of work area
- flood debris
- illegal activities including:
  - camping
  - illegal crops
  - logging
  - mining
  - off-road vehicles
  - shooting
- infrastructure including:
  - bridges
  - culverts
  - drains

  - fences
  - flow recording stations
  - gates
  - recording stations
- relevant legislation, regulations and workplace procedures
- risk factors and potential hazards of surface water systems

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

NWPCAD019 Monitor and operate groundwater extraction

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to monitor and operate groundwater extraction.

It includes monitoring the extraction of water from waterways and water bodies and reporting risks, compliance and complaints. It also includes operating pumps and meters, monitoring availability and quality of supply, controlling water flows from the source and applying legislative and workplace requirements.

This unit applies to field staff with responsibility for ensuring water extraction complies with water use legislation. Those undertaking this unit would work under appropriate supervision, while performing routine tasks in range of familiar contexts.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Catchment and Dams

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for work	**1.1** Interpret relevant legislation, workplace procedures and requirements

	1.2	Locate bore sites from plans and job specifications
	1.3	Schedule and plan inspection of bore asset and communicate with appropriate personnel
	1.4	Select, check and prepare equipment to monitor water extraction
	1.5	Conduct a risk assessment of bore operations and determine control measures
2 Monitor and operate groundwater extraction systems	**2.1**	Monitor designated locations within groundwater source area according to agreed schedule
	2.2	Conduct inspection of bore assets, take meter readings and for water depth
	2.3	Calculate recharge and extraction rates
	2.4	Collect samples and conduct standard tests according to workplace procedures
	2.5	Adjust pump flows to meet customer orders
	2.6	Identify breaches according to legislation and workplace procedures
3 Identify and report risks, breaches and complaints	**3.1**	Identify risks to stakeholders and environment
	3.2	Identify and report breaches according to workplace procedures
	3.3	Investigate and report complaints from the stakeholders regarding water allocation and quality

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPSOU051 Monitor and operate groundwater extraction.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPCAD019 Monitor and operate groundwater extraction

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- adjusting pump flows
- calculating recharge and extraction rates
- collecting samples
- conducting risk assessment
- identifying and preventing well contamination
- inspecting bore assets
- interpreting plans, instructions and standard operating procedures
- reading levels and meters

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- characteristics of groundwater and aquifer
- characteristics of groundwater systems
- effects of weather and conditions on operation of site or plant
- methods for investigating and reporting complaints
- risk factors and potential hazards of groundwater source systems
- relevant legislation, regulations and workplace procedures
- system hydraulics and flushing
- system layout
- types of bore construction and principles
- water extraction equipment including operation, capacity and limitations
- well contaminants

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

NWPGEN017 Apply the risk management principles of the water industry standards, guidelines and legislation

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to apply the risk management principles of the water industry standards, guidelines and legislation.

It includes identifying relevant guidelines of the water industry, describing risk management principles for the control of contaminants in the water cycle, applying principles to work context and reviewing and evaluating water quality management principles. It also includes complying with risk management principles established in relevant guidelines for the water industry which contribute to the improved management of water supply systems and the reduction of water quality risks.

This unit supports the attainment of skills and knowledge required for those working in all roles in the water industry. Those undertaking this unit would work under appropriate supervision, while performing routine tasks in a range of contexts.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

General

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

outcomes.	demonstrate achievement of the element.
1 Identify relevant guidelines of the water industry	**1.1** Identify and follow relevant guidelines and legislative requirements
	1.2 Identify the key features and elements or relevant water guidelines
2 Identify risk management principles for control of contaminants in the water cycle	**2.1** Identify the main components of workplace water systems
	2.2 Identify relevant risks and hazards utilising workplace risk management principles
	2.3 Identify the general function of controlling contaminants in the water system with the use of multiple barrier principles
3 Apply principles to work context	**3.1** Identify requirements for the workplace water quality management plan
	3.2 Identify the links between the regulatory framework and work practices
	3.3 Apply the principles to work practices
	3.4 Follow workplace procedures for recording water quality incidents
	3.5 Participate in continuous improvement of work practices to achieve water quality outcomes

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPGEN001 Apply the risk management principles of the water industry standards, guidelines and legislation.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPGEN017 Apply the risk management principles of the water industry standards, guidelines and legislation

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- accessing and interpreting risk management principles
- completing workplace documentation of water quality incidents
- identifying risk control measures
- identifying the main functions of a water supply system
- listing the requirements of risk management plans
- maintaining records of water quality incidents
- undertaking hazard identification and risk assessment on a specific project or worksite.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- chronic and acute health impacts from human exposure to contiminants in water
- principles of relevant guidelines
- relationship between guidelines, water quality management plans and work practices
- relationships between guidelines and state and territory regulatory requirements
- relevant legislation, regulations and workplace procedures
- water cycle
- water quality risk assesssment and contol procedures
- water quality risk factors and performance indicators
- workplace risk management procedures

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

NWPGEN020 Sample and test source or drinking water

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to sample and test source or drinking water.

It includes preparing for and conducting worksite source and treated water quality sampling and testing. It also includes reporting abnormal findings and finalising work. This unit does not include off-site laboratory testing.

This unit applies to those working in field operations in various industries. Those undertaking this unit would work under appropriate supervision, while performing routine tasks in a range of familiar contexts.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

General

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for water quality sampling and testing	**1.1** Determine work requirements from standard operation procedures
	1.2 Confirm and record samples, locations and tests to

		comply with requirements
	1.3	Select and check relevant equipment and tools to meet tasks and safety requirements
	1.4	Select and apply relevant sample preservation methods
	1.5	Select, fit and use personal protective equipment according to workplace procedures
	1.6	Limit hazards and contamination to protect self, work area and environment
2 Conduct water quality sampling and testing	**2.1**	Apply chain of custody principles according to workplace procedures
	2.2	Collect samples ensuring types, locations, times and labels comply with requirements and workplace procedures
	2.3	Prepare samples for off-site laboratory testing according to requirements
	2.4	Maintain integrity of samples during sampling and onsite testing
	2.5	Conduct worksite water quality tests according to workplace procedures and record results
	2.6	Assess and report abnormal characteristics to relevant personnel
3 Finalise work	**3.1**	Clear and restore work area
	3.2	Report observations or measurements requiring further action to relevant personnel
	3.3	Dispose of samples, clean and store test equipment according to workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPGEN007 Sample and test drinking water.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPGEN020 Sample and test source or drinking water

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- assessing risks
- calibrating worksite testing equipment
- collecting samples from at least one of the following:
  - source water
  - treated water
- disposing of waste and spent samples
- following sampling and testing procedures
- performing at least three of the following types of worksite tests on the collected samples:
  - chlorine
  - colour
  - dissolved oxygen
  - electrical conductivity
  - pH
  - temperature
  - turbidity
- planning and preparing for water sampling tasks
- preparing, checking and using equipment
- preparing, collecting, labelling and preserving water samples
- recording all required information

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- abnormal characteristics of water samples and test results
- chain of custody
- effects of weather and conditions on work
- hazards associated with collection of water samples

- maintenance and storage of reagents
- range and purpose of on worksite water quality testing and sampling
- requirements for maintaining sample integrity
- sample types for the following tests:
  - chemical
  - microbial
  - physical
  - radiological
- water sample preparation
- workplace policies and procedures

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

NWPGEN021 Sample and test wastewater

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to sample and test wastewater.

It includes preparing for and conducting wastewater sampling and testing and finalising work. It also includes collecting and preparing wastewater samples and performing wastewater tests. This unit does not include off-site laboratory testing.

This unit applies to those working in field operations in industries. Those undertaking this unit would work under appropriate supervision, while performing routine tasks in a range of familiar contexts.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

General

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for wastewater sampling and testing	**1.1** Determine work requirements from standard operating procedures
	1.2 Confirm and record samples, locations and tests to

		comply with requirements
	1.3	Select and check and relevant equipment and tools to meet tasks and safety requirements
	1.4	Select and apply relevant sample preservation methods
	1.5	Select, fit and use personal protective equipment according to workplace procedures
2 Conduct wastewater sampling and testing	**2.1**	Apply chain of custody principles according to workplace procedures
	2.2	Collect samples ensuring types, locations, times and labels comply with requirements and workplace procedures
	2.3	Prepare samples for off-site laboratory testing according to requirements
	2.4	Maintain integrity of samples during sampling and worksite testing
	2.5	Conduct worksite wastewater quality tests according to workplace procedures and record results
	2.6	Assess and report abnormal characteristics to relevant personnel
3 Finalise work	**3.1**	Clear and restore work area according to workplace procedures
	3.2	Report observations or measurements requiring further action to relevant personnel
	3.3	Dispose of samples, clean and store test equipment according to workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPGEN008 Sample and test wastewater.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPGEN021 Sample and test wastewater

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- assessing risks
- calibrating worksite testing equipment
- collecting samples from at least one of the following:
  - effluents
  - raw wastewater
  - reclaimed water
  - sludges
- disposing of waste and spent samples
- following sampling and testing procedures
- performing at least three of the following types of worksite tests on the collected samples:
  - dissolved oxygen
  - electrical conductivity
  - foaming
  - microscopic observations
  - odours
  - pH
  - redox potential
  - settleability
  - sludge blanket depth
  - temperature
  - visual observations
- planning and preparing for wastewater sampling tasks
- preparing, checking and using equipment
- preparing, collecting, labelling and preserving wastewater samples
- recording all required information

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- abnormal characteristics of wastewater samples and test results
- chain of custody
- effects of weather and conditions on work
- hazards associated with collection of wastewater samples
- maintenance and storage of reagents
- range and purpose of worksite wastewater testing and sampling
- requirements for maintaining sample integrity
- sample collection methods:
  - composite
  - grab
- sample types for the following tests:
  - chemical
  - microbial
  - physical
- wastewater sample preparation
- workplace policies and procedures

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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NWPGEN023 Use maps, plans, drawings and details

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to use maps, plans, drawings and details.

It includes reading and interpreting maps, plans, drawings and specifications and recording and advising on changes and errors.

This unit applies to those using maps, plans and drawings in industry. Those undertaking this unit would work under appropriate supervision, while performing routine tasks in a range of contexts.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

General

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Interpret maps, plans, drawings and specifications	**1.1** Identify and locate maps, plans, drawings and specifications required to complete work tasks
	1.2 Interpret commonly used symbols and abbreviations

			according to the drawing standards
		1.3	Interpret, apply and verify the latest version and functions of the legend
		1.4	Identify natural and constructed features on maps, plans and drawings
		1.5	Identify specifications to maps, plans and drawings
2	**Use maps, plans and drawings**	**2.1**	Implement technical data according to workplace procedures
		2.2	Use scales to calculate distances using maps and plans
		2.3	Confirm orientation, boundaries and identified features of the worksite
		2.4	Identify any errors in the maps, plans, drawings and specifications and report to relevant personnel
3	**Record and advise on changes and errors**	**3.1**	Amend a map or plan according to workplace procedures
		3.2	Take measurements and record features on a map or drawing
		3.3	Record and report amendments to relevant personnel

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPGEN011 Use maps, plans, drawings and specifications.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPGEN023 Use maps, plans, drawings and details

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- adjusting a map or plan representing an actual or simulated work environment including the following:
  - constructed features
  - natural features
  - symbols
- identifying errors in maps, plans, drawings and specifications locating maps, plans, drawings and specifications for work tasks
- locating worksites and boundaries
- using information provided in maps, plans and drawings to complete a task

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- features of maps, plans and drawings including:
  - contours
  - datum points
  - dimensions
  - gradients
  - constructed
  - natural
  - planes
  - sections
  - symbols
  - terminology
- formulas of volumes, area and mass
- range of maps, plans and drawings to different assignment situations
- relevant legislation, regulations and workplace procedures

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

NWPGEN027 Monitor and operate pump stations

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to monitor and operate pump stations.

It includes pump stations in water and wastewater systems, undertaking minor maintenance or organising more complex maintenance. It also includes gland adjusting, packing replacement and replacing fittings.

This unit applies to staff with specific responsibility for ensuring pump stations operate according to workplace procedures. Those undertaking this unit would work under appropriate supervision, while performing routine tasks in a familiar context, ensuring minimal damage to the environment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

General

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare work	**1.1** Determine pump station work requirements from standard operating and maintenance procedures

		1.2	Perform worksite inspection to prevent damage to other utilities and the environment
		1.3	Select and check equipment and tools to meet task and safety requirements
		1.4	Select, fit and use personal protective equipment according to workplace procedures
		1.5	Handle, use and store chemicals according to safety data sheet and workplace procedures
2	**Operate pump stations**	**2.1**	Identify and set or adjust pump station components
		2.2	Perform routine security inspections and cleaning duties according to workplace procedures
		2.3	Operate pump station according to manufacturer instructions
3	**Maintain pump stations**	**3.1**	Inspect pump station components, identify maintenance needs and report to relevant personnel
		3.2	Schedule maintenance tasks, order appropriate materials and conduct maintenance tasks according to maintenance schedule
		3.3	Identify and report pump station faults and perform minor repairs
4	**Monitor and adjust pump station performance**	**4.1**	Apply pump station performance targets
		4.2	Identify and apply monitoring points and timing
		4.3	Monitor pump station and adjust to maintain operational parameters
		4.4	Identify and report observations outside defined parameters to relevant personnel for further action
5	**Check outsourced maintenance work**	**5.1**	Check completed maintenance and repairs meet specifications
		5.2	Return pumping station to service
6	**Finalise work**	**6.1**	Check, maintain and store equipment, tools and materials and report defects to relevant personnel

6.2 Restore worksite according to environmental and workplace procedures

6.3 Maintain workplace records according to workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPSOU054 Monitor and operate pump stations.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPGEN027 Monitor and operate pump stations

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- checking quality of outsourced maintenance work
- collecting data
- conducting a security inspection
- finalising work, including completing documentation
- following plans and instructions
- identifying system faults, operational problems and hazards
- maintaining workplace records
- monitoring and adjusting pump station performance
- operating and maintaining pumps and pumping stations
- operating service
- planning and preparing for work, including selecting equipment and chemicals
- producing reports and logs
- responding to operational problems
- using safety and personal protective equipment
- using tools, equipment and machinery.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- control systems
- effects of weather and conditions on system including lightning strikes
- environmental aspects of operation
- equipment operation, capacity and limitations
- hazardous materials handling
- high and low voltage requirements
- lock-out procedures for mechanical and electrical installations
- principles affecting selection of pump station monitoring points and timing of monitoring

activities
- principles and purpose of pump operation
- pump and pump station operation and maintenance procedures and standards
- pump station components
- relevant legislation, regulations and workplace procedures
- relevant utilities and service bodies
- risk factors and potential hazards of operating wastewater transfer systems
- system hydraulics including suction and lift
- system layout
- types of pump and their operational function
- work, health and safety (WHS) requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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NWPNET020 Control electrical risk on metallic pipes

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to control electrical risk on metallic pipes.

It includes safely working on and assessing metallic pipes for electricity. It also includes using electrical detection devices, identifying yourself to customers and identifying utility assets.

This unit applies to those working as field and operational staff with responsibility for the control measures of high-risk electrical hazards. Those undertaking this unit would work independently under indirect supervision while performing routine tasks with a moderate level of complexity in a familiar context.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Networks

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for work	**1.1** Identify and locate area of work from job specifications, plans and diagrams
	1.2 Conduct risk assessment for environmental safety

		according to workplace procedures
	1.3	Select safety and electrical equipment and fit and use personal protective equipment according to workplace procedures
	1.4	Identify yourself to your customers and determine customer needs
	1.5	Identify utility assets or services by contacting relevant authorities
2 Assess metallic pipes for electricity	**2.1**	Use electrical testing device to check for presence of electricity on metallic water pipe according to workplace procedures
	2.2	Follow organisational procedures when electricity is detected
	2.3	Identify and clean attachment points and apply the testing and monitoring equipment and bridging conductors if no electricity is detected
	2.4	Continue to enforce electrical control measures during pipe replacement
3 Finalise work	**3.1**	Store and secure equipment and materials according to manufacturer instructions
	3.2	Restore worksite to meet environmental and organisational requirements
	3.3	Report and tag any damaged or faulty equipment according to workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPNET003 Control electrical risk on metallic pipes.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPNET020 Control electrical risk on metallic pipes

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- applying bridging conductors
- contacting relevant authorities for the correct location of utilities or services
- identifying and selecting appropriate equipment
- reading plans and diagrams
- replacing metallic pipe according to manufacturer or workplace requirements
- testing of bridging conductors
- using electrical testing and monitoring safety devices

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- customer service procedures
- electrical testing
- equipment operation, capacity and limitations
- excavation procedures and site restoration
- metallic pipes including:
  - cast iron
  - copper pipe
  - ductile iron
  - galvanised pipe
  - mild steel
- relevant legislation, regulations and workplace procedures
- relevant authorities to contact for the correct location of utilities or services including Dial Before You Dig
- risk factors and potential hazards associated with metallic pipes

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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NWPNET036 Perform leak detection

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to perform leak detection.

It includes planning leak detection activities and locating, identifying and reporting leaks in pressure mains water distribution networks.

This unit applies to those working as field staff with a specific responsibility for planning and implementing leak detection activities. Those undertaking this unit would work under appropriate supervision, while performing routine tasks in a familiar context, and ensuring minimum damage to the environment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Networks

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for leak detection	**1.1** Determine worksite boundaries and leak detection requirements from plans, specifications and instructions
	1.2 Conduct risk assessment for environmental and safety

		factors including personal and protective equipment to ensure it is safe to commence work
	1.3	Select and check leak detection equipment according to workplace procedures
	1.4	Determine work requirements for the maintenance and repair of assets from work drawings, plans, specifications and instructions
	1.5	Identify, notify and communicate with customers according to workplace procedures
2 Operate leak detection equipment	**2.1**	Determine and mark worksite boundaries from plans and service search diagrams
	2.2	Operate leak detection equipment according to manufacturer instructions
	2.3	Mark the location of leaks according to workplace procedures
	2.4	Locate leaks and arrange repair according to testing outcomes, relevant legislation and workplace procedures
3 Review, report and record work	**3.1**	Restore worksite according to environmental and workplace procedures
	3.2	Store equipment, tools and materials according to manufacturer and workplace procedures
	3.3	Complete and process workplace records according to workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPNET015 Perform leak detection.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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Assessment Requirements for NWPNET036 Perform leak detection

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- analysing data according to workplace procedures
- completing documentation
- identifying safety risks and hazards
- interpreting plans, specifications, policies and procedures
- locating and marking leaks and arranging repair activities
- locating, identifying and reporting leaks in water distribution networks
- operating leak detection equipment
- preparing for leak detection activities
- providing maintenance records for equipment

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- calculations and measurements
- landscape and ground structure of work area
- leak detection equipment
- relevant legislation, regulations and workplace procedures
- relevant utilities and service bodies
- risk assessment and the identification of potential hazards including:
  - effects of weather and conditions on site or plant
  - environmental aspects
  - equipment operation, capacity and limitations
  - identification, repair and lock out procedures
- system hydraulics
- system layout
- work drawings, plans and specifications

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

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NWPNET038 Install metering equipment

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to install metering equipment.

It includes preparing, reading, installing and maintaining flow control metering equipment. It also includes finalising work, restoring worksite and completing documentation.

This unit applies to those working as field staff with responsibility for installing meter equipment in compliance with relevant workplace and statutory requirements. Those undertaking this unit would work under appropriate supervision while performing routine tasks, in a familiar context and ensuring minimum damage to the environment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Networks

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for installing metering equipment	**1.1** Conduct environmental and work, health and safety risk assessment according to workplace procedures
	1.2 Determine work requirements and worksite from plans,

			specifications and instructions
		1.3	Check permission to access third-party sites, isolations and permits to work with relevant personnel
		1.4	Conduct earth leakage risk assessment according to workplace procedures
		1.5	Identify, check and prepare materials, equipment and resources required to satisfy job plan
		1.6	Identify metering equipment and recognise specifications for operation
		1.7	Select safety equipment and fit and use personal protective equipment (PPE)
		1.8	Present identification to customers and organise arrangements to complete repairs
		1.9	Select and use earth leakage safety equipment to metallic pipe for installing meters
2	**Read metering equipment**	**2.1**	Collect and report information on the performance of the metering equipment
		2.2	Identify potential faulty meters and apply workplace procedures
3	**Install flow control and metering devices**	**3.1**	Apply earth leakage safety equipment to metallic pipe according to workplace procedures
		3.2	Isolate water flow according to workplace requirements and procedures
		3.3	Install new meter or replace existing meter according to manufacturer instructions
		3.4	Restore water flow, check for leaks and meter is operating according to manufacturer instructions
		3.5	Remove earth leakage safety equipment and restore worksite
4	**Maintain flow control and metering devices**	**4.1**	Inspect flow control and metering facilities in water distribution
		4.2	Complete preventative maintenance and service equipment and facilities according to workplace procedures

5	**Finalise work and complete documentation**	**5.1** Review, record and report work according to workplace procedures
		5.2 Restore worksite, complete and submit workplace records
		5.3 Check, maintain, store equipment, tools, materials and tag and report faulty equipment according to workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPNET021 Install metering equipment.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPNET038 Install metering equipment

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- completing workplace documentation
- conducting risk assessments on worksite for operational, electrical and environmental safety factors
- conducting inspections, maintenance and servicing of metering, flow control and regulating devices
- identifying yourself to customers
- identifying and responding to operational problems
- installing and testing metering equipment
- installing flow control and metering devices
- installing, replacing and securing volumetric metering equipment for domestic, industrial and commercial premises
- interpreting plans, specifications and instructions for installation of flow control and metering devices
- preparing for installation of flow control and metering devices
- producing documentation
- using electrical safety procedures
- using personal protective equipment

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- data collection and recording system
- electrical earth leakage safety procedures
- environmental, landscape and ground structure of work area for restoration
- equipment operation, capacity and limitations
- flow measurement principles and procedures
- materials handling
- meter types

- relevant legislation, regulations and workplace procedures
- relevant utilities and service bodies
- risk factors and potential hazards
- system layout
- work in confined spaces and at heights

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

NWPNET039 Maintain and repair network assets for drinking water

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to maintain and repair network assets for drinking water.

It includes conducting maintenance and repairs on a variety of water distribution assets including storages, pumping stations, dosing stations and pipelines. It also includes reviewing, reporting and recording work.

This unit applies to those working as field staff with specific responsibility for ensuring the repair and maintenance of water assets. Those undertaking this unit would work under appropriate supervision, while performing routine tasks, in a familiar context, and ensuring minimum damage to the environment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Networks

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

1	**Prepare for work**	**1.1**	Conduct risk assessment for environmental, safety and water quality factors to ensure worksite is safe to work
		1.2	Determine work requirements, materials and configuration from plans, specifications, instructions and workplace procedures
		1.3	Check coordination issues with relevant personnel, including isolations, licences and permits to work
		1.4	Identify networks system operation requirements
		1.5	Identify, notify and communicate with customers according to workplace procedures
		1.6	Select, fit and use personal protective equipment (PPE)
2	**Conduct maintenance and repairs**	**2.1**	Isolate infrastructure according to workplace procedures
		2.2	Determine appropriate repair method from job specifications and instructions
		2.3	Ensure materials, pipes and fittings are appropriately disinfected prior to installation
		2.4	Check maintenance and repairs to assets to ensure specifications are met according to workplace procedures
		2.5	Restore worksite according to environmental and workplace procedures including performing calculations
3	**Review and report work**	**3.1**	Tag and report faulty equipment and tools and advise appropriate personnel
		3.2	Store equipment, tools and materials according to manufacturer and workplace instructions

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPNET022 Maintain and repair network assets for drinking water.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPNET039 Maintain and repair network assets for drinking water

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- applying disinfection according to workplace procedures
- assisting with worksite planning including personnel, equipment and materials
- checking permits, approvals, other utilities diagrams and maps with relevant personnel
- communicating with appropriate personnel and customers
- conducting risk assessment on worksite for safety and environmental factors
- determining location, size, utilities, services from plans, specifications and workplace procedures
- ensuring system hygiene and water quality
- interpreting plans, instructions and procedures
- maintaining and repairing assets
- performing work-related calculations
- selecting and applying appropriate PPE
- using appropriate tools and equipment for work to be undertaken

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- characteristics of pipe materials
- concrete placement techniques including compaction
- control system procedures
- disinfection of systems and chemical usage
- effects of weather and conditions on construction worksite or plan
- environmental, health aspects and impacts
- equipment operation, capacity and limitations
- excavation techniques and requirements
- ground support systems
- landscape and ground structure of work area

- lockout procedures
- pipe systems and installation requirements
- relevant legislation, policies and procedures
- relevant utilities and service bodies to identify allocation of road reserve
- risk factors and potential hazards of maintenance processes
- safety data sheets
- system hydraulics
- testing and sampling processes
- workplace drawings, plans, specifications and instructions

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

NWPNET040 Maintain and repair network assets for wastewater

Modification History

Release 2. Alteration to PE item 9, removal of PE item 12 and alteration to KE point 15.

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to maintain and repair network assets for wastewater.

It includes conducting maintenance and repair on a variety of wastewater distribution assets including pipes, drains and wastewater collection assets. It also includes reviewing, reporting and recording work.

This unit applies to those working as field staff with specific responsibility for ensuring repair and maintenance of wastewater assets is completed in a safe and timely manner. Those undertaking this unit would work under appropriate supervision, while performing routine tasks, in a familiar context, and ensuring minimum damage to the environment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Networks

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for work	**1.1** Conduct risk assessment for environmental and safety factors to ensure worksite is safe to work
	1.2 Determine work requirements, materials and configuration from plans, specifications, instructions and workplace procedures
	1.3 Check coordination issues with relevant personnel, including isolations, licences and permits to work
	1.4 Identify networks system operation requirements
	1.5 Identify, notify and communicate with customers according to workplace procedures
	1.6 Select, fit and use personal protective equipment (PPE)
2 Conduct maintenance and repairs	**2.1** Isolate infrastructure according to workplace procedures
	2.2 Determine appropriate repair method from job specifications and instructions
	2.3 Check maintenance and repairs to assets to ensure specifications are met according to workplace procedures
	2.4 Restore worksite according to environmental and workplace procedures including performing calculations
3 Review and report work	**3.1** Tag and report faulty equipment and tools and advise appropriate personnel
	3.2 Store equipment, tools and materials according to manufacturer and workplace instructions

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPNET023 Maintain and repair network assets for wastewater.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPNET040 Maintain and repair network assets for wastewater

Modification History

Release 2. Alteration to PE item 9, removal of PE item 12 and alteration to KE point 15.

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- assisting with planning worksite including personnel, equipment and materials
- checking permits, approvals, other utilities diagrams and maps with relevant personnel
- communicating with appropriate personnel and customers
- conducting risk assessment on worksite for safety and environmental factors
- determining location, size, utilities, services from plans, specifications and workplace procedures
- identifying and responding to operational problems including main, connection chokes, pump stations and faults
- interpreting plans, instructions and procedures
- maintaining and repairing assets by:
  - maintaining pump stations
  - repairing access chambers
  - undertaking excavation
- maintaining, repairing and replacing wastewater infrastructure including at least 5 of the following:
  - clearing blockages
  - controlling flows in gravity networks
  - installing connections
  - installing pipes and fittings
  - jet cleaning
  - jet foaming
  - locating and repairing chokes
  - making joints
  - measuring and cutting pipes
  - repairing valves
  - selecting and placing bedding and backfill material
  - undertaking closed-circuit television (CCTV) inspection

    - undertaking excavation
- performing work-related calculations
- preserving personal safety
- selecting and applying appropriate PPE
- using tools and equipment for work in wastewater

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- causes of blockages including:
    - foreign objects
    - pipe displacements
    - roots intrusion
- characteristics of pipes and fittings
- concrete placement techniques including compaction
- control system procedures
- effects of weather and conditions on construction site or plant
- environmental, health aspects and impacts
- equipment operation, capacity and limitations
- excavation techniques and requirements
- formwork preparation and positioning
- ground support systems
- infiltration of foreign matter into the wastewater system
- landscape and ground structure of work area
- lockout procedures
- pipe systems and installation requirements
- relevant legislation, regulations, policies and procedures
- relevant utilities and service bodies to identify allocation of road reserve
- risk factors and potential hazards of maintenance processes
- safety data sheets
- system hydraulics
- testing and sampling systems
- work drawings, plans, specifications and instructions

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

NWPTRT005 Monitor and operate water treatment processes

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to monitor and operate water treatment processes.

It includes reporting on water treatment plant system performance and processing quality control. It also includes operating water treatment processes, and complying with relevant legislation, regulations and guidelines.

This unit applies to operational staff in water treatment plants with responsibility for the practical and safe operation of plant, equipment and processes. Those undertaking this unit would work under appropriate supervision, while performing routine tasks, within a familiar context.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Treatment

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for work	**1.1** Determine work requirements from job specifications and plans

	1.2	Select and check equipment required to meet safety requirements of task and worksite
	1.3	Select, fit and use required safety equipment, including personal protective equipment (PPE)
2 Monitor and operate treatment processes	**2.1**	Inspect plant according to workplace procedures
	2.2	Collect process samples and conduct standard tests according to workplace procedures
	2.3	Operate treatment processes according to workplace procedures
	2.4	Perform adjustments to enhance system performance
3 Complete documentation	**3.1**	Collect, record and complete process data according to workplace procedures
	3.2	Identify and report observations outside defined parameters to relevant personnel for further action

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPTRT001 Operate and control water treatment processes.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPTRT005 Monitor and operate water treatment processes

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- applying workplace procedures
- collecting and labelling samples
- collecting and recording data
- completing documentation
- conducting routine plant inspections
- performing disinfection processes
- performing water treatment separation processes
- preparing and applying chemical dosing.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- demands and uses of water, both domestic and industrial
- interpreting safety data sheets
- physical, chemical and microbiological characteristics of water
- post-treatment processes
- pre-treatment processes
- reasons for water treatment
- relevant legislation, regulations and workplace procedures
- relevant technologies for operating and controlling water treatment processes
- relevant water treatment guidelines and standards
- risk factors and potential hazards associated with the operation of water treatment processes
- risk management principles
- sources of water
- types of chemicals and water chemistry
- types of treatment plants and processes
- water and chemical principles

- water cycle.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

NWPTRT027 Monitor and operate wastewater treatment processes

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Application

This unit involves the skills and knowledge required to operate and control wastewater processes.

It includes monitoring and operating wastewater treatment plants, reporting system performance and process quality control. It also includes ensuring wastewater disposal or re-use meets state or territory legislative requirements.

This unit applies to operational staff in wastewater treatment plants with responsibility for the practical and safe operation of plant, equipment and processes. Those undertaking this unit would work under appropriate supervision, performing routine tasks within a familiar context.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Treatment

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for work	**1.1** Determine work requirements from job specifications and plans

	1.2	Select and check equipment required to meet safety requirements task and worksite
	1.3	Select, fit and use required safety equipment including, personal protective equipment (PPE)
2 Monitor treatment processes	**2.1**	Inspect plant according to workplace procedures
	2.2	Collect process samples and conduct standard tests according to workplace procedures
	2.3	Operate wastewater treatment processes according to workplace procedures
	2.4	Perform adjustments to enhance system performance
3 Complete documentation	**3.1**	Collect, record and complete process data according to workplace procedures and process requirements
	3.2	Identify, data outside of operational parameters and report to relevant personnel for further action

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to NWPTRT061 Operate and control wastewater processes.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Assessment Requirements for NWPTRT027 Monitor and operate wastewater treatment processes

Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- applying workplace procedures
- completing documentation
- conducting routine plant inspections
- operating and adjusting at least one of the following processes:
  - primary treatment
  - secondary treatment
  - tertiary treatment
  - solids management
- taking samples and performing standard tests

Knowledge Evidence

- chemical and biological principles of wastewater treatment
- hydraulics and organic loading in wastewater plants
- physical, chemical and microbiological characteristics of wastewater treatment
- preliminary treatment, primary treatment, secondary treatment, tertiary treatment and solids management
- reasons for wastewater treatment
- relevant workplace procedures, guidelines and industry standards
- state or territory legislative requirements for wastewater treatment processes
- risk factors and potential hazards relating to wastewater treatment
- sources of wastewater
- types of components
- water cycle

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

PUAWHS002 Maintain safety at an incident scene

Modification History

Release 1. This is the first release of this unit of competency in the Public Safety Training Package.

Application

This unit of competency involves the skills and knowledge required to recognise potential health and safety risks and to then act to eliminate or control those risks at incident scenes and to prevent injury to self, other personnel or members of the public.

The unit is applicable to public safety personnel attending an incident scene and links to the individual's duty of care responsibility to maintain personal safety and to be aware of how actions affect the safety of others including team members, other agency/organisational personnel and the public.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

The fire sector is those sections of government departments, statutory authorities or organisations that have responsibility under jurisdictional arrangements for the delivery of firefighting and fire management services.

It is essential that the prerequisite units listed below are obtained prior to the issuance of this unit to individuals within the fire sector or the units contributing to the attainment of a fire qualification.

PUAFIR210 Prevent injury

Competency Field

Work, Health and Safety

Unit Sector

Public Safety

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

outcomes.	demonstrate achievement of the element.
1 Determine hazards at incident site	**1.1** Site hazards affecting the safety of self or other personnel are identified, risks are assessed and are communicated with others at the scene
	1.2 Operational safety procedures are implemented, in accordance with organisational policies and procedures
	1.3 Duties are undertaken, in accordance with Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) requirements
2 Implement hazard controls at incident scene	**2.1** Hazards are identified, and mitigation procedures are selected, in accordance with organisational procedures
	2.2 Control measures are applied, reported and recorded, in accordance with organisational policies and procedures
	2.3 Changes in incident situation or conditions are reported immediately to designated personnel
	2.4 Hazard controls are monitored and communicated to relevant personnel to ensure continuing effectiveness
	2.5 Hazard control and risk mitigation measures are implemented with minimum damage to the environment, whilst maintaining safety of self and others
	2.6 Incident and/or accident scene is secured to preserve the scene and maintain public safety, in accordance with organisational policies and procedures
3 Maintain personal safety	**3.1** Personal protective clothing and equipment is selected and checked, in accordance with organisational procedures, to ensure it is operational prior to entry into incident situation
	3.2 Personal protective clothing and equipment appropriate to dealing with the hazard is worn and used, in accordance with organisational procedures and manufacturers' guidelines
	3.3 Water and food intake, rest breaks and shelter requirements are maintained
	3.4 Survival techniques and/or strategies are implemented, in accordance with organisational policies, procedures

		and guidelines
4 Contribute to maintaining safety of other group members	**4.1**	Impact of own or others' actions on safety is considered and modified, as required
	4.2	Contact is maintained with group members, in accordance with organisational procedures
	4.3	Signals are correctly used, interpreted, confirmed and acted upon

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to PUAOHS002B Maintain safety at an incident scene.

Links

PUA Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=3eca5672-6d5a-410b-8942-810d0ba05bbf

Assessment Requirements for PUAWHS002 Maintain safety at an incident scene

Modification History

Release 1. This is the first release of this unit of competency in the Public Safety Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes

- applying Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) requirements
- communicating using non-verbal and verbal techniques
- determining hazards and assessing risks at incident site
- following organisational policies and procedures
- implementing hazard controls at incident scene
- maintaining safety at an incident scene including personal safety and contributing to the safety of other group members
- recording information, updating records and completing documentation
- using communication equipment
- using personal protective clothing and equipment
- working with others in a team

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of

- awareness of incident hazards and hazard control equipment
- commonly encountered hazards and safety precautions to prevent injury
- concept of risk
- duty of care responsibilities and obligations
- factors that may affect safety at an incident which must require monitoring
- legislation and regulations
- means of relaying warnings to other personnel
- methods of hazard control
- organisational documentation, policies and procedures
- personal protective clothing and equipment
- requirements for reporting
- roles and responsibilities at an incident scene

- safety procedures and hazard equipment to prevent injury
- survival techniques and strategies at an incident
- work environments including incidents and response situations
- Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) requirements including risk mitigation

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations. Where this is not appropriate, assessment must occur in industry approved simulated workplace operational situations that reflect workplace conditions.

Resources for assessment must include access to

- a range of relevant exercises, case studies and/or simulations
  - that demonstrate competency in maintaining personal safety and the safety of others
- relevant and appropriate materials, equipment, tools and personal protective clothing and equipment currently used in industry
- applicable documentation including organisational procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

PUA Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=3eca5672-6d5a-410b-8942-810d0ba05bbf

RIIHAN309F Conduct telescopic materials handler operations

Modification History

Release	Comments
Release 1	This version first released with RII Resources and Infrastructure Industry Training Package Version 3.0.

Application

This unit describes the skills and knowledge required to conduct telescopic materials handler operations.

This unit applies to those working in site-based roles.

Licensing, legislative, regulatory and certification requirements that apply to this unit can vary between states, territories, and industry sectors, and must be sourced from state jurisdictions prior to applying this unit.

Unit Sector

Coal mining

Extractive

Metalliferous mining

Drilling

Civil Infrastructure

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Plan and prepare for telescopic materials handler operations	1.1 Access, interpret and apply telescopic materials handler documentation 1.2 Obtain, interpret, clarify and confirm work requirements 1.3 Identify hazards and environmental issues, assess the risks and implement control measures in line with workplace policies 1.4 Select and wear personal protective equipment required for work

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	activities 1.5 Identify, obtain and apply signage requirements in line with workplace procedures 1.6 Select required telescopic materials handler equipment or attachments and confirm the suitability of the work activities 1.7 Coordinate and communicate planned activities with other at the site prior to commencement of work activity
2. Operate telescopic materials handler in line with established requirements	2.1 Perform pre-start and start-up check in line with workplace procedures 2.2 Check telescopic materials handler controls, brakes, attachments and other implements for manoeuverability and serviceability and ensure faults are rectified or reported within scope of own responsibility and according to workplace procedures 2.3 Assess site and operating hazards and apply safe operating techniques 2.4 Operate telescopic materials handler using techniques suited to equipment capabilities, site and work conditions, and according to workplace procedures
3. Attach, secure, lift, carry and place materials to complete work activity	3.1 Use load handling communication methods as per standard operating procedures with all parties 3.2 Communicate with dogman to establish the weight of the load 3.3 Communicate with dogman to ensure safe working load requirements have been assessed and appropriate slings and lifting gear has been selected, attached and secured in line with workplace procedures 3.4 Locate machinery to ensure stable and effective shift of materials according to work requirements 3.5 Shift the load safely and effectively, using hand, audible and communication signals, in line with workplace procedures 3.6 Park up, shut down, secure and carry out post operational inspection of equipment in line with workplace procedures
4. Select, remove, fit and use attachments for a telescopic materials handler	4.1 Select attachment for the task and move and fit attachment in line with workplace procedures 4.2 Test and confirm correct fitting and operation 4.3 Use attachment within design limits and in accordance with

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	workplace procedures 4.4 Remove, clean and store attachment in line with workplace procedures
5. Relocate the telescopic materials handler	5.1 Prepare machine and equipment for relocation in line with safe work practices 5.2 Transport machine and equipment safely between worksites, observing relevant site codes and traffic management requirements
6. Conduct housekeeping activities	6.1 Clean-up work area and dispose or recycle materials according to workplace procedures. 6.2 Manage and/or report hazards to maintain a safe working environment 6.3 Complete and file or distribute documentation in a manner that complies with workplace practices

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Skill	Description
Reading	• Identifies and interprets information from workplace procedures, documentation, legislation and regulations
Numeracy	• Uses equipment operating capacity schedule to confirm safe weight load limits

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
RIIHAN309F Conduct telescopic materials handler operations (Release	RIIHAN309E Conduct telescopic materials handler operations (Release 1)	Minor updates to reflect changes to operator maintenance and relocation	Equivalent

1)		activities, and assessment conditions for attachments.	

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=88a61002-9a21-4386-aaf8-69c76e675272

Assessment Requirements for RIIHAN309F Conduct telescopic materials handler operations

Modification History

Release	Comments
Release 1	This version first released with RII Resources and Infrastructure Industry Training Package Version 3.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements and performance criteria of this unit.

The candidate must demonstrate completion of telescope materials handler operations that safely, effectively and efficiently follow workplace procedures to carry out work activity on at least two occasions, and include:

- performing pre-start, start-up and shutdown procedures
- checking controls, brakes and attachments for manoeuverability and serviceability and rectifying or reporting faults
- operating the telescopic materials handler
- attaching and securing appropriate lifting gear
- shifting the load
- selecting, fitting, testing, using and removing attachments, which must be certified and approved in line with workplace procedures
- transporting the machine and equipment between work sites
- parking and securing equipment

In the course of the above the candidate must also:

- locate and apply required documentation, policies and procedures
- select and wear personal protective equipment required for work activities
- apply safe work practices, identifying and reporting potential hazards and environmental issues, and assess risks
- access, interpret and apply technical information
- apply fault finding techniques
- monitor and manage equipment performance using indicators and alarms
- identify common equipment faults
- use a range of communication techniques and equipment essential to the safe completion of work activity, including hand, audible and other signals
- meet written and verbal reporting requirements and procedures associated with telescopic materials handler operations

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements and performance criteria of this unit. This includes:

Key policies and procedures, legislation and established requirements for telescopic materials handler operations, including those relating to:

- isolation and traffic control responsibilities and authorities
- safety data sheet and hazardous materials handling methods
- development and compliance with job safety analyses and safe work method statement
- maintenance and basic diagnostic
- recyclable materials
- housekeeping activities
- environmental management plan

Key factors affecting work activities described in performance evidence above, including:

- telescopic materials handler types, characteristics, technical capabilities and limitations
- calculating safe working loads
- methods of changing machine attachments
- safe operating techniques in varying terrain
- telescopic materials handler and attachment operating techniques

Assessment Conditions

Mandatory conditions for assessment of this unit are stipulated below. The assessment must:

- include access to:
  - telescopic materials handler
  - attachments
  - personal protective equipment
- be conducted in a safe environment and,
- be assessed in context of this sector's work environment and,
- be assessed in compliance with relevant legislation/regulation and using policies, procedures, processes and operational manuals directly related to the industry sector for which it is being assessed and
- confirm consistent performance can be applied in a range of relevant workplace circumstances

Where personal safety or environmental damage are limiting factors, assessment may occur in a simulated work environment* provided it is realistic and sufficiently rigorous to cover all aspects of this sector's workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.

Assessor requirements

Assessors must be able to clearly demonstrate current and relevant industry knowledge and experience to satisfy the mandatory regulatory standards as set out in the Standards for Registered Training Organisations (RTOs) 2015/AQTF mandatory requirements for assessors current at the time of assessment and any relevant licensing and certification requirements. This includes:

- vocational competencies at least to the level being delivered and assessed
- current industry skills directly relevant to the training and assessment being provided
- current knowledge and skills in vocational training and learning that informs their training and assessment
- formal relevant qualifications in training and assessment
- having knowledge of and/or experience using the latest techniques and processes
- possessing a high level of RII training product knowledge
- having an understanding and knowledge of legislations and regulations relevant to the industry and to employment and workplaces
- demonstrating the performance evidence, and knowledge evidence as outlined in this Unit of Competency, and
- the minimum years of current** work experience after competency has been obtained as specified below in an industry sector relevant to the outcomes of the unit.

It is also acceptable for the appropriately qualified assessor to work with an industry expert to conduct assessment together and for the industry expert to be involved in the assessment judgement. The industry expert must hold the relevant vocational competencies and have current industry skills directly relevant to the training and assessment being provided, and must work alongside a trainer and/or assessor to conduct the assessment. This means the industry subject matter expert should hold the unit being assessed (or an equivalent unit), and must also demonstrate skills and knowledge from the minimum years of current work experience after competency has been obtained as specified below, including time spent in roles related to the unit being assessed:

Industry sector	**AQF indicator level*** **	**Required assessor or industry subject matter expert experience**
Drilling, Metalliferous Mining, Coal Mining, Extractive (Quarrying) and Civil Infrastructure	1	1 Year
	2	2 Years
Drilling, Coal Mining, Extractive (Quarrying), Metalliferous Mining and Civil Infrastructure	3-6	3 Years
Other sectors	Where this unit is being assessed outside of the Resources and Infrastructure Sectors, assessor and/or industry subject matter expert experience should be in-line with industry standards for the sector in which it is being assessed and, where no industry standard is specified, should comply with any relevant	

	regulation.

*Guidance on simulated environments has been stipulated in the RII implementation guide located on VETNet.

**Assessors can demonstrate current work experience through employment within industry in a role relevant to the outcomes of the unit; or, for external assessors this can be demonstrated through exposure to industry by conducting a minimum number of site assessments as determined by the relevant industry sector, across various locations.

*** While a Unit of Competency does not have an AQF level, where a unit is being delivered outside of a qualification the first numeric character in the unit code should be considered as the AQF indicator level for assessment purposes.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=88a61002-9a21-4386-aaf8-69c76e675272

TLIF0021 Administer the implementation of fatigue management strategies

Modification History

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit involves the skills and knowledge required to administer the implementation of fatigue management strategies.

It includes monitoring the implementation of fatigue management strategies; recognising breaches of fatigue management policies, procedures and regulations; and developing and assessing staff competence in fatigue management. It also includes providing feedback to staff on deficiencies in their fatigue management skills and knowledge and reporting to management on the implementation of fatigue management policy.

Work is performed under limited supervision generally as a team leader or supervisor.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

F – Safety Management.

Unit Sector

Not applicable.

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Monitor the implementation of fatigue	**1.1** Work activities of workers and suppliers in organisation's products and services supply chain are monitored in accordance with organisation's fatigue risk management

management strategies		implementation plan
	1.2	Reviews are undertaken of scheduled versus actual hours of work and, where a compliance breach is identified, corrective action is taken to analyse the reasons concerned and to rectify the situation
2 Recognise breaches of fatigue management policies, procedures and regulations	**2.1**	Signs and symptoms of fatigue in workers are identified in accordance with workplace procedures
	2.2	Breaches of fatigue management policies, procedures and regulations in the work activities of workers and suppliers are recognised and reported in accordance with workplace procedures
	2.3	Errors and incidents relating to non-compliance with fatigue management procedures and regulations are investigated and reported in accordance with workplace procedures
	2.4	Corrective action is taken in conjunction with workers or suppliers concerned to ensure ongoing and future compliance with fatigue management policies and procedures
3 Develop and assess staff competence in fatigue management	**3.1**	Appropriate training programs and learning resources are developed and provided to ensure workers understand the organisation's fatigue management policies and procedures, and the risks, causes and consequences of fatigue
	3.2	Workers are assessed to confirm they are competent in understanding the organisation's fatigue management strategies and can apply them to their day-to-day work activities and responsibilities
	3.3	Deficiencies in worker competence to apply organisation's fatigue management strategies to their work activities are identified and appropriate learning opportunities are provided to enable workers to achieve required competence
4 Provide feedback to staff on deficiencies in fatigue management skills and knowledge	**4.1**	Evidence of worker deficiencies in implementing fatigue management strategies is obtained and interpreted from observation of signs and symptoms of fatigue in work activities, periodic evaluations of work performance and assessments of competence carried out as part of training and learning activities
	4.2	Workers are provided with feedback on identified deficiencies in their implementation of fatigue management strategies and appropriate support and counselling is provided on how they might address these deficiencies

	4.3 Further learning opportunities and information are provided to assist workers to implement organisation's fatigue management strategies in their area of work activity, as required
5 Report on the implementation of fatigue management policy	**5.1** Periodic audits of the implementation of fatigue management strategies in the work area/s of responsibility are carried out in accordance with workplace procedures
	5.2 Accidents, safety incidents and near misses are investigated and analysed to identify the extent to which fatigue might have been a contributing factor
	5.3 Reports on implementation of organisation's fatigue risk management system are prepared and submitted to designated personnel in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions can be found in the TLI Transport and Logistics Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLIF3063 Administer the implementation of fatigue management strategies.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

Assessment Requirements for TLIF0021 Administer the implementation of fatigue management strategies

Modification History

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and include:

- adapting to changes in relevant regulations, policies and procedures
- applying relevant legislation and workplace procedures
- assisting workers to identify their own learning needs on matters related to fatigue management
- communicating effectively with others regarding risk-based fatigue management
- modifying activities and taking appropriate initiatives to administer the implementation of organisation's fatigue risk management system depending on contexts, risk situations and environments
- planning and carrying out audits and reviews of organisation's fatigue risk management system
- planning and organising training and learning opportunities for workers on fatigue management and implementing organisation's fatigue risk management system
- interpreting documentation on organisation's fatigue risk management system and related policy, instructions, procedures and regulations and applying this information to supervisory activities
- recognising breaches of fatigue management strategies and regulations and taking appropriate actions in accordance with organisation's fatigue risk management system
- working collaboratively with workers and management staff to implement organisation's fatigue risk management system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and include knowledge of:

- chain of responsibility obligations as they apply to fatigue risk management in relation to heavy vehicle transport activities
- factors that increase fatigue-related incidents
- hazards and risks created by fatigue in the workplace
- how fatigue affects workplace performance
- how fatigue contributes to workplace incidents

- lifestyles that promote the effective long-term management of fatigue
- options and resources for providing training and learning opportunities for workers on fatigue management and the implementation of organisation's fatigue risk management system, including:
  - fatigue management refresher training
  - in-depth training on fatigue and fatigue management techniques
  - initial induction training
  - remedial training where existing competence is assessed as being insufficient
- organisation's fatigue risk management system, including:
  - control of factors that can contribute to fatigue and fatigue-related incidents
  - corrective actions
  - the operational area/s being administered
  - workplace policies and procedures
- procedures for auditing and reviewing organisation's fatigue risk management system, and related policies and procedures for reporting audit outcomes
- processes and resources for assessing worker fatigue risk management competence
- relevant codes, regulations, permit and licence requirements
- relevant work health and safety (WHS)/occupational health and safety (OHS) regulations
- signs, symptoms, causes and consequences of fatigue in relation to workers and organisation
- strategies and ways of managing the risk of fatigue
- ways of assisting individuals to assess their own sleep patterns and to evaluate their own fitness for work such as providing information on how to identify sleep disorders and how to obtain appropriate treatment
- ways of providing feedback to workers on identified deficiencies in their competence to implement fatigue risk management strategies
- ways of recognising fatigue
- workers and organisation responsibilities for implementing fatigue management regulations and policies, including suppliers and sub-contractors in organisation's services and products supply chain.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

TLIF2010 Apply fatigue management strategies

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package.

- Minor changes to unit Application
- Minor changes to Assessment Conditions.

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit involves the skills and knowledge required to apply fatigue management strategies within the transport and logistics industry.

It includes identifying and acting on signs of fatigue and implementing appropriate strategies to minimise fatigue during work activities, in particular when operating equipment, trains, vehicles, load shifting equipment, marine vessels and aircraft.

Work is undertaken in compliance with relevant legislation, regulations, codes and guidelines.

Work is performed under some supervision generally within a team environment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

F – Safety Management.

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the	Performance criteria describe the performance needed to demonstrate

essential outcomes.	achievement of the element.
1 Identify and act on signs of fatigue	**1.1** Potential causes of fatigue are identified and actions taken to minimise their effects in accordance with workplace procedures
	1.2 Personal warning signs of fatigue are recognised, and necessary steps are taken in accordance with workplace procedures, to ensure that effective work capability and alertness are maintained
2 Implement strategies to minimise fatigue	**2.1** Workplace procedures are assessed to minimise fatigue
	2.2 Factors that increase the risk of fatigue-related accidents and incidents are minimised
	2.3 Fatigue management strategies are implemented in accordance with workplace policy and procedures
	2.4 Lifestyle choices are made that promote the effective long-term management of fatigue
	2.5 Effective practices in combating fatigue are adopted and applied
	2.6 Personal fatigue management strategies are communicated to relevant people
	2.7 Appropriate counter measures are planned to combat fatigue

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions can be found in the TLI Transport and Logistics Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLIF2010A Apply fatigue management strategies.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

Assessment Requirements for TLIF2010 Apply fatigue management strategies

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package.

- Minor changes to unit Application
- Minor changes to Assessment Conditions.

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and include:

- adapting to changes in rosters and standard operating procedures (SOPs) as they relate to fatigue management
- adjusting lifestyle patterns to ensure effective fatigue management during work activities
- applying precautions and required actions to minimise and control the effects of fatigue when carrying out own work functions
- applying relevant legislation and workplace procedures
- communicating effectively with others when applying fatigue management strategies
- identifying and meeting own learning needs about fatigue management related matters
- modifying activities and taking appropriate initiatives to manage fatigue in the workplace depending on work contexts, risk situations and environments
- reading and interpreting instructions, procedures, regulations and signs related to fatigue management and applying them to work activities
- recognising symptoms of fatigue and taking appropriate actions in accordance with fatigue management regulations and workplace procedures
- working collaboratively with others to manage and minimise the effects of fatigue during work activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and include knowledge of:

- causes and effects of fatigue on workers
- factors that increase fatigue-related accidents
- how fatigue affects workplace performance

- how fatigue contributes to workplace accidents
- lifestyles that promote effective long-term fatigue management
- relevant fatigue management codes, regulations, permit and licence requirements
- relevant work health and safety (WHS)/occupational health and safety (OHS) regulations as they relate to fatigue
- risks and hazards created by workplace fatigue
- sources of information on fatigue
- strategies and ways of managing fatigue
- ways of recognising fatigue
- workplace policies and procedures related to fatigue management and the control of factors that can contribute to fatigue and fatigue-related accidents.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective (PPE) equipment currently used in industry
- applicable documentation, including legislation, regulations, codes of practice, workplace procedures and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

TLILIC0003 Licence to operate a forklift truck

Modification History

Release 1. This is a release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit specifies the skills and knowledge required to operate a forklift truck safely in accordance with all relevant legislative requirements. Competence in this unit, does not in itself result in a HRWL licence to operate this plant.

Forklift truck means a powered industrial truck equipped with lifting media made up of a mast and an elevating load carriage to which is attached a pair of fork arms or other attachments that can be raised 900 mm or more above the ground, but does not include a pedestrian-operated truck or a pallet truck.

A person performing this work is required to hold a forklift truck High Risk Work Licence (HRWL).

This unit requires a person operating a forklift truck to:

- plan for the work/task
- prepare for the work/task
- perform work/task
- pack up

Licensing/Regulatory Information

Legislative and regulatory requirements are applicable to this unit of competency.

This unit is based on the licensing requirements of Part 4.5 of the Model Work Health and Safety (WHS) Regulations and meets Commonwealth, State and Territory HRWL requirements.

The National Assessment Instrument (NAI) is the mandated assessment for the HRWL to operate the relevant licencing class as detailed in this unit.

Pre-requisite Unit

Not applicable

Competency Field

LIC - Licencing Units

Unit Sector

Not applicable

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan work/task	**1.1** Task requirements are identified from work orders or equivalent and confirmed with relevant people and site inspection is conducted in accordance with workplace procedures
	1.2 Work area operating surface is assessed to determine suitability for operational use of forklift truck in accordance with workplace procedures
	1.3 Suitability of forklift truck and attachment working load limit (WLL) is determined for the load/s and work/task requirements in accordance with manufacturer requirements and workplace procedures
	1.4 Working area is inspected and appropriate paths for operating the forklift truck and moving and placing load/s in work area are assessed and managed in accordance with workplace procedures
	1.5 Hazard and risk control measures are identified and reported to relevant person/s in accordance with workplace procedures
	1.6 Traffic management plan implementation is confirmed in accordance with workplace procedures
	1.7 Appropriate communication procedures are identified with relevant people in accordance with workplace procedures
	1.8 All work is confirmed to ensure coverage of work/task requirements for the relevant work area is in accordance with workplace procedures

2 Prepare for work/task	**2.1**	Consultation with workplace person/s is maintained to ensure workplan is clear and consistent with site requirements in accordance with safe work procedures
	2.2	Weather and work environmental conditions are assessed to determine any impact on forklift truck operations in accordance with manufacturer requirements and safe work procedures
	2.3	Risk control measures for hazards identified are checked for implementation in accordance with safe work procedures
	2.4	Forklift truck is accessed in a safe manner in accordance with manufacturer requirements and workplace procedures
	2.5	Forklift truck logbook is checked in accordance with manufacturer, regulatory requirements and safe work procedures
	2.6	Pre-start checks are carried out and any damage and defects are reported, recorded and appropriate action is taken in accordance with safe work procedures and manufacturer requirements
	2.7	Forklift truck is set up correctly with any relevant attachments as per work plan in accordance with relevant manufacturer requirements including data plate and safe work procedures
	2.8	Operational checks are carried out and any damage and defects are reported, recorded and appropriate action is taken in accordance with manufacturer requirements and safe work procedures
	2.9	Hazard and risk control measures are checked for implementation and communicated to people in the work area in accordance with safe work procedures
3 Perform work/task	**3.1**	Weight and positioning of load is assessed to ensure compliance with forklift truck data plate requirements and in accordance with safe work procedures

	3.2	Forklift truck is operated safely in accordance with manufacturer requirements and safe work procedures
	3.3	Loads are monitored constantly when lifting, moving, lowering and placing to ensure stability of load and avoidance of hazards in accordance with safe work procedures
	3.4	Unplanned and unsafe situations are responded to in accordance with safe work procedures
	3.5	Loads are picked up, transported and placed using all forklift truck movements in accordance with safe work procedures
	3.6	Forklift truck is parked, switched off and isolated appropriately in accordance with manufacturer requirements and safe work procedures
4 Pack Up	**4.1**	Forklift truck shutdown procedures are carried out in accordance with manufacturer requirements and safe work procedures
	4.2	Forklift truck is secured to prevent unauthorised access/use in accordance with safe work procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC2001 Licence to operate a forklift truck

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

Assessment Requirements for TLILIC0003 Licence to operate a forklift truck

Modification History

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and include:

- applying safe operating procedures for a forklift truck including:
  - maintaining safe operating speed
  - travelling with load lowered to an appropriate height for the terrain, operating surface and visibility in relation to direction of travel
- applying relevant forklift truck manufacturer requirements and data plate information and approved modifications to attachments fitted are in accordance with manufacturer requirements
- carrying out pre-start checks, including visual inspection which must include:
  - battery charge as required by manufacturer requirements
  - checking and interpreting data plate/s are relevant to the attachment and the forklift truck
  - checking for signs of paint separation and stressed welds indicating potential structural weakness
  - document evidence of damage
  - engine / mechanical fluid level checks including fuel as required by manufacturer requirements
  - ensuring availability of correct forklift truck logbook and updating records as required
  - ensuring forklift truck tynes or other attachment/s are securely fitted
  - ensuring seat and mirrors are adjusted appropriately and seat belt is functional
  - fluid leaks
  - lights are working effectively
  - safety equipment checks
  - signage and labels to ensure they are visible and legible
  - wheels and tyres for damage/correct inflation if applicable
- conducting and applying risk and hazard assessment strategies including:
  - insufficient lighting
  - other specific hazards including dangerous goods
  - overhead hazards and fixed structures, roof beams and doorways
  - restricted and poorly ventilated areas

  - surface suitability based on forklift truck and task requirements
  - the risk of collision with people, moving plant and fixed structures
  - weather conditions
- complying with Commonwealth, State and Territory Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) legislation, regulations safe work and workplace procedures
- conducting operational checks, which must ensure:
  - all controls are located, identified and tested for functionality
  - all hydraulic functions operated to maximum extension and ensuring attachment (if fitted) movements and control functions are smooth and comply with operating requirements
  - hazard warning systems (e.g. reversing beepers, lights and horns) are functional
  - recording and maintaining accurate information relating to forklift truck operations
  - safety devices as fitted
  - start-up is in accordance with manufacturer requirements
  - steering, transmission and brake functions comply with operating requirements
  - there are no unusual noises
- confirming and following traffic management plan procedures relevant to their role in the work area
- conducting relevant procedures for refuelling and isolating fuel/power source as per manufacturer requirements using appropriate PPE
- determining relevant lifting attachment to perform work/task
- determining lift requirements including:
  - positioning of unusually balanced/shaped loads
  - centre of gravity
  - dynamic nature of load
  - tyne/attachment positioning
  - weight
- ensuring risk control measures within the work area are effective as per workplace procedures
- identifying, isolating and tagging out defective equipment and reporting to authorised person/s
- interpreting and confirming relevant documentation, workplace instructions, safety information, emergency procedures for the work task and relevant area
- interpreting workplace procedures in relation to various environmental conditions
- maintaining communication with other workplace personnel through using worksite procedures including:
  - audible and visual warning devices
  - signage
  - two-way radio
  - verbal instructions
  - written instructions
- maintaining three points of contact whilst accessing and egressing forklift truck and ensuring

rungs / steps are free of hazards

- operating and monitoring safe forklift truck operations using minimum 250kg dynamic and non-dynamic loads that include:
  - aligning tynes/attachment to load
  - carrying out a lift to 75% of the maximum height
  - conducting trial lift to ensure forklift truck and load are stable, and load is safe to move
  - correctly using horns and mirrors in workplace
  - correctly positioning and using an observer to assist when operating with a load that may restrict vision or be placed out of vision of the operator
  - driving applicable to conditions and moving loads safely
  - driving a forklift truck safely with load in forward and reverse, while maintaining visibility through an obstacle course including:
    - an 'S' bend with a minimum 90 degrees left and right turn
    - ensuring load/s remains stable through pick up, transport and placement
    - forklift truck speed is appropriate to load and surroundings
    - lowering dynamic and non-dynamic loads to appropriate height for travel in forward and reverse
  - picking up, driving, manoeuvring and placing dynamic and non-dynamic loads safely at various heights within a compliant racking system
  - picking up, driving, manoeuvring and placing dynamic and non-dynamic loads safely into/onto an elevated, flat, stable area
  - tilting mast (or forks if applicable) to ensure balance of load
  - using gluts/dunnage appropriately and lowering load safely
  - using tilt and side shift (where fitted) safely to manoeuvre dynamic and non-dynamic loads into allocated space
- reporting to relevant person/s on site risk control measures that are not in place or are deficient
- setting up an exclusion zone
- securely parking forklift truck and isolating in appropriate position including:
  - minimising possible access by unauthorised person/s
  - tynes/attachment lowered to required position in accordance with manufacturer requirements
  - park brake applied
  - switching off, isolating fuel/power source and removing key according to workplace procedures
- shutting down a forklift truck in accordance with manufacturer requirements and workplace procedures

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- Australian and industry standards, codes of practice and guidelines to safely operate a forklift truck
- communication procedures including:
  - audible and visual warning devices
  - hand signals
  - questioning techniques
  - signage
  - traffic warning systems
  - two-way radio
  - written instructions
- forklift truck characteristics and capabilities, manufacturer requirements and instructions for any attachments
- impact of the following on the operation of the forklift truck including:
  - failure/loss of control including brakes and steering
  - failure of equipment during forklift truck operations
  - forklift truck instability causes including:
    - deterioration of ground condition
    - overloading
    - pick up and placement of load
    - irregular loads
  - operating on ramps and uneven surfaces and in restricted spaces
  - use of forklift truck data plate and attachment data plate and appropriate methodology to determine weight of a load is appropriate for forklift truck and any attachment if fitted including the estimation or determination from:
    - labels on the actual load
    - markings on the actual load
    - paperwork such as consignment notes, running sheets and weighbridge dockets
    - weighing a carton and calculating load
- manufacturer requirements, instructions and operator's manual
- problems, and appropriate response procedures to unplanned and/or unsafe environmental conditions including:
  - wind
  - lightning
  - water/ice impacted surface/ground
  - rain
  - extreme heat
  - Ultra violet (UV) exposure
- problems and equipment faults, and implementing appropriate response procedures to unplanned and/or unsafe situations including:
  - lock out and tag out procedures
- relevant procedures for refuelling and recharging forklift truck using appropriate PPE

including:

- gas bottle
- connecting battery to charger and disconnecting battery from charger and reconnecting to forklift truck
- refuelling

- procedures for recording, reporting and maintaining workplace records and information
- risk assessment process including hierarchy of control:
  - elimination
  - substitution
  - isolation
  - engineering controls
  - administrative controls
  - personal protective equipment (PPE)
- safe use and compliance of different types of attachments including:
  - bale clamps
  - carpet spike for carpet rolls
  - drum carrier
  - jib attachment
  - paper roll clamps
  - personnel work platforms
  - rotators
  - slippers/fork extensions on tynes
- suitability and lifting capability of the attachment to be used
- shut down procedures for a forklift truck in accordance with manufacturer requirements
- traffic management plan procedures and requirements
- typical routine problems encountered operating a forklift truck and associated equipment, and adjustments required for correction
- workplace procedures including work plan which may be verbal, documented/written, or electronically generated
- work area operating surface suitability including issues with:
  - backfilled ground
  - bitumen (damaged, cracked)
  - concrete (damaged, cracked)
  - hard compacted soil
  - potholes
  - railway tracks
  - rough uneven or difficult terrain including sloping surfaces, uneven surfaces, steel decks and grates
  - soft soils
  - trench covers
- Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety

and Health (OSH) requirements, safe work and workplace procedures

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations. Where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

- Simulators must not be used in the assessment of this unit of competency.

Resources for assessment must include access to:

- a suitable forklift truck that complies with AS 2359 Powered industrial trucks and is in a safe/serviceable condition in accordance with manufacturer requirements
- associated equipment for forklift truck operations
- suitable dynamic and non-dynamic loads
- suitable compliant racking system
- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including:
  - approved codes of practice and relevant guidance material
  - relevant Australian technical standards
  - manufacturer guidelines (instructions, requirements or checklists), relevant industry standards and operating procedures (where applicable)

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package:

- Minor statement changes in unit Application
- Minor changes and re-ordering of Performance Evidence
- Minor re-ordering of Knowledge Evidence
- Minor statement changes in Assessment Conditions.

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit specifies the skills and knowledge required to safely operate a boom-type Elevating Work Platform (EWP) where the length of the boom is 11 metres or more in accordance with all relevant legislative requirements. Competence in this unit, does not in itself result in a Risk Work Licence (HRWL) to operate this plant.

Boom-type elevating work platform means a telescoping device, hinged device, or articulated device, or any combination of these, used to support a platform on which personnel, equipment and materials may be elevated.

A person performing this work is required to hold a boom-type elevating work platform HRWL.

This unit requires a person operating an EWP to:

- plan for the work/task
- prepare for the work/task
- perform work/task
- pack up.

Licensing/Regulatory Information

Legislative and regulatory requirements are applicable to this unit of competency.

This unit is based on the licensing requirements of Part 4.5 of the Model Work Health and Safety (WHS) Regulations and meets Commonwealth, State and Territory HRWL requirements.

The National Assessment Instrument (NAI) is the mandated assessment for the HRWL to operate the relevant licencing class as detailed in this unit.

Pre-requisite Unit

Not applicable

Competency Field

LIC - Licencing Units

Unit Sector

Not applicable

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan work/task	**1.1** Task requirements are identified from work orders or equivalent and confirmed with relevant people and a site inspection is completed in accordance with workplace procedures
	1.2 Work area ground/operating surface is assessed to determine suitability for operational use of EWP in accordance with manufacturer requirements and workplace procedures
	1.3 EWP capabilities are established for the load/s and work/task requirements in accordance with manufacturer requirements and workplace procedures
	1.4 Appropriate paths for operating the EWP and moving in work area are assessed and determined in accordance with workplace procedures
	1.5 Relevant hazard and risk control measures are applied and advised to relevant person/s in accordance with workplace procedures

	1.6	Traffic management plan implementation is confirmed in accordance with workplace procedures
	1.7	Appropriate communication procedures are identified, with relevant people in accordance with workplace procedures
	1.8	All work is confirmed to ensure coverage of work/task requirements for the relevant work area in accordance with workplace procedures
2 Prepare for work/task	**2.1**	Consultation with workplace person/s is maintained to ensure workplan is clear and consistent with site requirements in accordance with workplace procedures
	2.2	Risk control measures for hazards identified are checked for implementation in accordance with workplace procedures
	2.3	Safety equipment including Personal Protective Equipment (PPE) are inspected, fitted correctly and used in accordance with manufacturer requirements and safe work procedures
	2.4	EWP is accessed in a safe manner in accordance with manufacturer requirements and safe work procedures
	2.5	Pre-start EWP checks are carried out in accordance with manufacturers requirements and safe work procedures
	2.6	EWP is started and is checked for any abnormal noises in accordance safe work procedures
	2.7	EWP is positioned correctly as per work plan in work area in accordance with relevant manufacturer requirements and safe work procedures
	2.8	EWP is stabilised appropriately in accordance with the workplan, relevant manufacturer requirements and safe work procedures

	2.9	Operational checks from base controls are carried out in accordance with relevant manufacturer requirements and safe work procedures
	2.10	All platform controls are located, identified and tested in accordance with manufacturer requirements and safe work procedures
	2.11	All damage and defects are reported and appropriate action is taken to rectify in accordance with manufacturer requirements and safe work procedures
	2.12	EWP logbook is inspected and is correct for the EWP, is completed and signed in accordance with manufacturer requirements and safe work procedures
	2.13	Weather and work environmental conditions are assessed to determine any impact on EWP operation and positioning as per workplan in accordance with manufacturer requirements and safe work procedures
3 Perform work/task	**3.1**	Relevant hazard prevention/control measures identified are checked for implementation in accordance with safe work procedures
	3.2	EWP is safely located at point of work in work area in accordance with safe work procedures
	3.3	EWP platform is positioned for work tasks and stability and all operations are monitored constantly in accordance with safe work procedures
	3.4	Work gear and tools are stowed and secured in accordance with safe work procedures
	3.5	EWP is operated using all movements in accordance with safe work procedures and manufacturer requirements
	3.6	Unplanned and unsafe situations are responded to in accordance with safe work procedures

	3.7	All communication signals are correctly interpreted and followed whilst EWP is operated in accordance with safe work procedures
	3.8	EWP platform is accessed and egressed in accordance with safe work procedures and manufacturer requirements
	3.9	EWP is parked, switched off and isolated appropriately in accordance with manufacturer requirements and safe work procedures
4 Pack up	**4.1**	Post-operational EWP checks are carried out in accordance with manufacturer requirements and safe work procedures
	4.2	EWP boom is retracted, lowered, stowed and secured in accordance with manufacturer requirements and safe work procedures
	4.3	Safety equipment and PPE is disconnected from platform in accordance with safe work procedures
	4.4	Relevant motion locks and brakes are applied as required in accordance with manufacturer requirements and safe work procedures
	4.5	Outriggers and/or stabilisers, plates or packing if fitted are stowed and secured in accordance and with manufacturer requirements and safe work procedures
	4.6	EWP is shut down in accordance with manufacturer requirements and safe work procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC2005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

Assessment Requirements for TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package:

- Minor statement changes in unit Application
- Minor changes and re-ordering of Performance Evidence
- Minor re-ordering of Knowledge Evidence
- Minor statement changes in Assessment Conditions.

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and include:

- advising relevant person/s on site in relation to any hazards and risk elimination/control strategies
- applying safe operating procedures for an Elevating Work Platform (EWP) including all functions within the safe working rated capacity including:
  - boom/s as low as possible and fully retracted whilst travelling (self propelled EWP only)
  - boom/s in line with EWP where practical whilst travelling (self propelled EWP only)
  - EWP stability
  - gently accelerating and braking to minimise boom/s swing (self propelled EWP only)
  - maintaining safe operating speed in relation to the work condition
  - travelling with work platform raised to an appropriate height for the terrain and visibility in relation to direction of travel (self propelled EWP only and in accordance with manufacturers specifications)
- applying emergency procedures
- applying traffic management plan procedures relevant to their role in the work area
- carrying out operational checks on EWP including:
  - testing of all EWP safety devices
  - all controls are located, identified and tested for functionality from the base controls and platform controls
  - hazard warning systems including travel beepers and lights are functional
  - start-up is in accordance with manufacturer requirements
  - steering, transmission and brake functions comply with operating requirements (self

propelled EWP only)
    - there are no unusual noises
- carrying out pre-start checks, including visual inspection which must include:
    - battery fluid level as required by manufacturer requirements
    - checking compliance plate is relevant to the load/s being used on the EWP
    - engine / mechanical fluid level checks as required by manufacturer requirements
    - ensuring availability of correct logbook and updating records as required
    - ensuring EWP platform and attachment/s fitted in platform are secured
    - evidence of damage
    - fluid leaks
    - lights are working effectively (where fitted)
    - safety equipment checks
    - signage and labels to ensure they are visible and legible
    - structural weaknesses including paint separation or stressed welds
    - wheels and tyres for damage/correct inflation if applicable
- checking compliance plate and load chart for reach requirements and load suitability
- clarifying workplan and checking understanding
- complying with Commonwealth, State and/or Territory work health and safety (WHS)/occupational health and safety (OHS)/occupational safety and health (OSH) legislation and regulations
- controlling and operating a boom type elevating work platform ensuring movements and control functions are safe, smooth and comply with operating requirements including:
    - any combination of the movement of the extending boom used to support a platform on which personnel, equipment and materials are elevated to perform the work task/s
    - avoidance of ground depressions
    - correctly using observer guidance of work platform, main chassis and extending boom
    - demonstrating the safe operation of an EWP in forward and reverse, while maintaining visibility (where applicable)
    - driving (where applicable) applicable to conditions and moving platform and load/s safely
    - ensuring warning devices are functioning correctly
    - interpreting directional arrows correctly on platform controls during forward, reverse, left and right
    - lowering boom to its resting position
    - monitoring platform, main chassis and extending boom movement constantly ensuring safe work procedures are followed
    - raising platform and slewing within manufacturer requirements
    - raising platform to its full extent or 75% of the maximum height capacity (whichever is greater)
    - stability of the EWP and the work platform
    - manoeuvring and positioning the platform to perform work task/s safely whilst at its full extent or a minimum height of 75% of the maximum capacity (whichever is greater)

- conducting and applying hazard identification and risk elimination or minimisation strategies including:
    - barricades and controls to prevent the risk of collision with people, moving vehicles and fixed structures
    - environmental conditions including:
        - wind
        - lightning
        - water impacted ground
        - rain
        - extreme heat
        - Ultra Violet (UV) exposure
    - ground conditions (surface and slopes) and assessing work area operating surface suitability based on machine and task requirements
    - overhead hazards including electric lines and service pipes
    - personal protective equipment (PPE)
    - restricted areas and crush points from work platform and external surroundings
    - safety related tags on electrical switches/isolators that have an impact on point of work of EWP operator
    - sufficient lighting
    - suitable area for set-up, positioning and safely operating EWP
    - suitable firm and stable operating surface
    - use of safety observer
- entering work platform correctly including:
    - lowering platform safely and stably to appropriate height to access safely
    - clipping on of fall restraint/arrest device
    - accessing platform safely
- exiting work platform correctly including:
    - lowering platform safely and stably to appropriate height to egress safely
    - unclipping of fall restraint/arrest device
    - exiting platform safely
- identifying, isolating and tagging out defective equipment and reporting to authorised person/s
- inspecting and using relevant safety equipment, including:
    - anchor point/s
    - emergency retrieval system from base controls and platform controls where fitted
    - energy absorber/s
    - lanyard/s
    - safety harness/es
- interpreting and confirming relevant documentation, workplace instructions, safety information and emergency procedures for the work task and relevant area
- interpreting workplace procedures in relation to various work environmental conditions

- maintaining communication with other workplace personnel using appropriate workplace procedures including procedures to ensure all movements are conveyed clearly and succinctly including:
  - 2-way radio
  - audible and visual warning devices
  - making and interpreting hand signals
  - questioning to confirm understanding
  - signage
  - written instructions
- recording and maintaining accurate information relating to EWP operations
- reporting to relevant person/s on site risk control measures that are not in place or deficient
- stabilising procedures for an EWP including:
  - checking levels
  - removing obstacles and obstructions
  - deploying and retracting outriggers (if fitted)
  - establishing correct size plates for packing (if required)
- shutting down a boom type EWP in accordance with manufacturer requirements and workplace procedures
- using and interpreting EWP manufacturer requirements and data, including compliance plate and load chart, to enable correct EWP selection for task including:
  - boom
  - platform
  - weight including outrigger load or wheel load.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- Australian and industry standards, codes of practice and guidelines to safely operate an EWP (boom length 11 metres or more) including:
  - nominal reach, measured horizontally from centre point of rotation to outer edge of platform in its most extended position
  - vertical distance from floor of platform to surface supporting elevating work platform with platform at its maximum height
- appropriate mathematical calculations to estimate loads ensuring EWP is not overloaded
- appropriate workplace communication procedures including:
  - 2-way radio
  - audible and visual warning devices
  - questioning techniques
  - signage
  - hand signals

    - traffic warning systems
    - written instructions
- compliance with permit condition requirements including:
    - from electrical supply authority
    - if operating on roads or footpaths
- EWP characteristics and capabilities, manufacturer requirements and instructions
- hazards including:
    - all ground and /or operating surface hazards
    - traffic including pedestrians, vehicles, other mobile plant and building structures
    - overhead hazards including electric lines, service pipes, doorways, roof beams, and lights
    - obstacles or obstructions
    - insufficient lighting
    - other relevant hazards
- identification and avoidance of person/s potential crush or entrapment points
- identification and avoidance of potential contact with overhead electrical conductor's
- identification and avoidance of potential contact with structures near work platform/boom or chassis
- impact of the following on the operation of the EWP including:
    - failure/loss of control including brakes and steering
    - failure of equipment including hydraulic system
    - EWP and platform instability due to:
        - deterioration of ground/operating surface condition
        - gradient of operating surface
        - overloading
        - poor load placement
        - irregular loads
    - emergency procedures and safety equipment, including the use of:
        - safety harness/es
        - energy absorbers
        - lanyard/s
        - anchor point/s
        - emergency retrieval systems
- lock out and tag out procedures
- problems, and appropriate response procedures to unplanned and/or unsafe environmental conditions
- procedures for recording, reporting and maintaining workplace records and information
- relevant manufacturer requirements and instructions
- relevant procedures for refuelling/recharging EWP using appropriate PPE
- risk assessment process including hierarchy of control:
    - elimination

  - substitution
  - isolation
  - engineering controls
  - administrative controls
  - personal protective equipment (PPE)
- problems and equipment faults, and implementing appropriate response procedures to unplanned and/or unsafe situations
- procedures for shutting down a boom type EWP in accordance with manufacturer requirements
- relevant documentation requirements
- suitability and lifting capability of the EWP to be used
- traffic management plan procedures and requirements
- typical routine problems encountered operating a EWP and adjustments required for correction
- wind speed factors that affect stability of EWP as per manufacturer requirements
- work area operating surface suitability including issues with:
  - backfilled ground
  - bitumen (damaged, cracked)
  - concrete (damaged, cracked)
  - hard compacted soil
  - potholes
  - railway tracks
  - rough uneven or difficult terrain including sloping surfaces, uneven surfaces, steel decks and grates
  - soft soils
  - trench covers
- work health and safety (WHS)/occupational health and safety (OHS)/occupational safety and health (OSH) and codes of practice requirements for boom type elevating work platforms
- work plan which may be verbal, documented/written, or electronically generated

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations. Where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace

conditions.

- Simulators must not be used in the assessment of this unit of competency

Resources for assessment must include access to:

- appropriate boom-type elevating work platform (boom length 11 metres or more) in a safe/serviceable condition in accordance with manufacturer requirements
- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including:
  - approved codes of practice and relevant guidance material
  - relevant Australian technical standards
  - manufacturer guidelines (instructions, requirements or checklists), relevant industry standards and operating procedures (where applicable).

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

TLILIC0022 Licence to operate a slewing mobile crane (up to 20 tonnes)

Modification History

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit specifies the skills and knowledge required to safely operate a slewing mobile crane with a Maximum Rated Capacity (MRC) up to 20 tonnes in accordance with all relevant legislative responsibilities. Competence in this unit, does not in itself result in a High-Risk Work Licence (HRWL) to operate this plant.

Slewing mobile crane means a mobile crane incorporating a boom or jib that can be slewed, but does not include:

- a front-end loader, or
- a backhoe, or
- an excavator, or
- other earth moving equipment, when configured for crane operation.

A person performing this work is required to hold a slewing mobile crane with a MRC up to 20 tonnes HRWL.

This unit requires a person operating a slewing mobile crane with an MRC up to 20 tonnes to:

- plan for the work/task
- prepare for the work/task
- perform work/task
- pack up.

Licensing/Regulatory Information

Legislative and regulatory requirements are applicable to this unit of competency.

This unit is based on the licensing requirements of Part 4.5 of the Model Work Health and Safety (WHS) regulations and meets Commonwealth, state and territory HRWL requirements.

The National Assessment Instrument (NAI) is the mandated assessment for the HRWL to operate the relevant licensing class as detailed in this unit.

Pre-requisite Unit

Not applicable.

Competency Field

LIC - Licencing Units.

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan work/task	**1.1** Task requirements are identified from work orders or equivalent, a lift plan is confirmed with associated personnel and a site inspection is conducted in accordance with workplace procedures
	1.2 Work area operating surface is confirmed to determine ground suitability for operational use of mobile crane in accordance with workplace procedures
	1.3 Mobile crane Rated Capacity (RC) and the lifting gear Working Load Limit (WLL) are established for the load/s and work/task requirements in accordance with manufacturer requirements and workplace procedures
	1.4 Appropriate paths for operating the mobile crane and moving and placing load/s in work area are assessed and determined in accordance with workplace procedures
	1.5 Relevant hazard identification and risk elimination/control measures are applied and advised to associated personnel in accordance with workplace procedures
	1.6 Traffic management plan implementation is confirmed in accordance with workplace procedures
	1.7 Appropriate communication procedures are identified with associated personnel in accordance with workplace procedures
	1.8 All crane and lifting operations are confirmed to ensure relevant work area requirements are correct in

		accordance with a lift plan and workplace procedures
	1.9	Information required to ensure that lifting equipment and gear inspection, use, maintenance and storage complies with manufacturer requirements is obtained and interpreted
2 Prepare for work/task	**2.1**	Consultation with workplace personnel is established and maintained to ensure lift plan is clear and consistent with site requirements in accordance with a lift plan and workplace procedures
	2.2	Risk control measures for hazards identified are checked for implementation in accordance with the lift plan and safe work procedures
	2.3	Mobile crane is accessed safely in accordance with manufacturer requirements and safe work procedures
	2.4	Pre-start mobile crane checks are carried out and any damage and defects are reported, recorded and appropriate action is taken in accordance with manufacturer requirements and safe work procedures
	2.5	Mobile crane is set up correctly with any lifting gear and stabilised as per the lift plan in accordance with relevant manufacturer requirements, including load chart/s and safe work procedures
	2.6	Fly jib is set up as required in accordance with specific manufacturer requirements and safe work procedures
	2.7	Operational checks are carried out and any damage and defects are reported, recorded and appropriate action is taken in accordance with manufacturer requirements and safe work procedures
	2.8	Crane logbook is checked to confirm current compliance, is correct for the crane type, is completed and signed and required rectifications have been signed off in accordance with manufacturer requirements and safe work procedures
	2.9	Weather and work environment conditions are assessed to determine any impact on mobile crane operations in accordance with manufacturer requirements and safe work procedures

	2.10	Weight of the load is confirmed
	2.11	Derated WLL of lifting equipment resulting from selected slinging techniques is calculated and confirmed as suitable to meet the requirements of the lift plan
	2.12	Suitable lifting points and slinging techniques are identified
	2.13	Lifting equipment and gear are confirmed as ready for safe use
	2.14	Load destination stability is confirmed ensuring it is able to bear the load and is prepared for safe access and landing
3 Perform work/task	**3.1**	Lifts are determined within the RC of the mobile crane in accordance with the load chart/s and lift plan
	3.2	Boom/jib and hook block are safely positioned over the load following directions from associated personnel in accordance with the lift plan and safe work procedures
	3.3	Main hook, including any lifting gear where required, are connected to the load and used safely in accordance with the lift plan, safe work procedures and manufacturer requirements
	3.4	Test lift is carried out in accordance with dogging and safe work procedures
	3.5	Loads are transferred using relevant crane movements and tag lines, as required, in accordance with lift plan and safe work procedures
	3.6	Load and crane movement is monitored constantly and crane is operated safely in accordance with lift plan and safe work procedures
	3.7	All required communication signals are correctly interpreted and followed whilst crane is operated in accordance with the lift plan and safe work procedures
	3.8	Load is lowered and landed safely in accordance with lift plan and safe work procedures

	3.9	Lifting gear is positioned for safe disconnection from the load and crane is positioned for next task in accordance with lift plan and safe work procedures
	3.10	Lifting equipment and gear are inspected for defects, and defective items are isolated, tagged and reported
4 Pack up	**4.1**	Crane boom/jib, lifting gear and associated equipment are stowed and secured as required in accordance with manufacturer requirements and safe work procedures
	4.2	Crane fly jib is removed to storage position and secured as required in accordance with manufacturer requirements and safe work procedures
	4.3	Relevant motion locks and brakes are applied as required in accordance with manufacturer requirements and safe work procedures
	4.4	Outriggers, plates and/or packing are stowed and secured in accordance with manufacturer requirements and safe work procedures
	4.5	Crane is shut down and secured to prevent unauthorised access/use in accordance with safe work procedures
	4.6	Shutdown crane checks are carried out in accordance with safe work procedures and manufacturer requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the TLI Transport and Logistics Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC0010 Licence to operate a slewing mobile crane

(up to 20 tonnes).

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

Assessment Requirements for TLILIC0022 Licence to operate a slewing mobile crane (up to 20 tonnes)

Modification History

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and include:

- applying relevant mathematical calculations in conjunction with lift plan and load chart to determine radius requirements and relevant lifting gear to perform work/task to enable crane to be configured for load, including:
  - boom
  - counterweight/s
  - fly-jib
  - line pull
  - outrigger positioning
  - type of hook
- applying relevant crane movements, including:
  - boom/jib up and down (luffing)
  - catching load swing appropriately
  - positioning and using main and auxiliary hook and lifting gear to connect to load safely
  - raising and lowering hoist
  - slew boom/jib
  - telescope in and out (where manufacturer requirements allow)
  - travel
- carrying out operational checks ensuring:
  - all controls are located, identified and tested for functionality
  - all hydraulic functions are operational
  - lifting gear movements and control functions are smooth and comply with lift plan
  - hazard warning systems, safety, audible and visual warning devices are checked for to ensure they are functional, including:
    - reversing beepers
    - lights
    - horns
    - crane computer alarm (where fitted)

    - anti-two block alarms (where fitted)
  - start-up is in accordance with manufacturer requirements and safe work procedures
  - there are no unusual noises
  - steering, transmission and brake functions comply with operating requirements
- conducting and applying risk and hazard assessment strategies, including:
  - confirming work area operating surface suitability based on crane and task requirements
  - dynamic loads
  - load swing
  - overloading
  - pick and placement of load
  - tyre pressures or track condition
  - asymmetric loads
  - overhead hazards
  - restricted and poorly ventilated areas
  - risk of collision with people, moving plant and fixed structures
  - adequate lighting
  - weather conditions
- complying with Commonwealth, state and territory work health and safety (WHS)/occupational health and safety (OHS) legislation and safe work procedures
- communicating with other associated personnel through using appropriate workplace procedures, including:
  - two-way radio
  - active listening
  - demonstrating and interpreting hand signals
  - questioning to confirm understanding
  - signage/visual aids
  - whistles
  - written instructions
- completing pre-start checks, including:
  - boom wiring harness connection
  - engine/mechanical fluid level checks as required by manufacturer requirements
  - ensure rungs/steps are free of hazards
  - fire extinguisher
  - fluid leaks
  - lights work effectively
  - locating, identifying and confirming all controls
  - mirrors and seat are adjusted appropriately for the operator
  - presence of correct logbook
  - safety equipment checks
  - signage and labels to ensure they are visible and legible

    - checking for signs of paint separation and stressed welds indicating potential structural weakness
    - tyres and wheels for damage/wear and correct inflation
    - updating records as required
    - visual damage or equipment faults
- confirming and following traffic management plan procedures relevant to their role in the work area
- determining any defects or faults with operation of crane, recording in relevant documentation and reporting to relevant person/s
- ensuring risk control measures within the work area are effective in accordance with safe work procedures
- following directions of dogger or rigger
- inputting crane configuration into crane computer (where fitted) and checking operation to accurately reflect crane configuration
- interpreting and acting on communications signals, including:
    - hoist down - hand and whistle and two-way radio
    - hoist up - hand and whistle and two-way radio
    - luff boom down - hand and whistle and two-way radio
    - luff boom up - hand and whistle and two-way radio
    - slew left - hand and whistle and two-way radio
    - slew right - hand and whistle and two-way radio
    - stop - hand and whistle and two-way radio
    - telescope in - hand and whistle and two-way radio (where manufacturer requirements allow)
    - telescope out - hand and whistle and two-way radio (where manufacturer requirements allow)
- interpreting and confirming relevant documentation for the work task and relevant area
- maintaining three points of contact whilst accessing crane
- monitoring load disconnection from hook is safe and ensuring no movement of crane operational controls
- operating a slewing mobile crane configured to a Rated Capacity (RC) of between 7 tonnes and up to 20 tonnes to lift and move four different loads using the main hook through an obstacle course, including a 180-degree minimum slew using all crane operational controls while the load is in full view of the crane operator. Loads must consist of:
    - a load of >50% of the RC of the crane with a boom length of >75%, and
    - stillage containing at least ten scaffolding standards or containing a load of steel pipes of equivalent weight that requires a dogger to sling, and
    - an asymmetric load that requires a dogger to sling, and
    - a round load with a minimum diameter of 300 mm and minimum length of three m that requires a dogger to sling
- positioning the mobile crane for safe operation for:
    - application of the task/s

  - manoeuvring in the workplace
  - the stability of the mobile crane and the load
- recording and maintaining accurate information relating to crane operations
- reporting to relevant person/s on workplace control measures that are not in place or deficient
- setting up and validating an exclusion zone in accordance with the lift plan
- shutting down a slewing mobile crane in accordance with manufacturer requirements and safe work procedures
- stabilising a slewing mobile crane for operation by:
  - correctly positioning plates or packing
  - deploying outriggers
  - establishing correct size plates or packing in accordance with the lift plan
  - checking levels
- planning for and managing load stability, including:
  - confirming and inspecting appropriate lifting gear and applying slinging techniques appropriate to the type of load, its mass and centre of gravity
  - confirming the Working Load Limit (WLL) tags of the lifting equipment and gear and calculating the deration of the WLL resulting from the slinging techniques applied
- test-lifting load just clear of lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure:
  - slinging is correct
  - all crane equipment is functioning properly
  - load centre of gravity is correct
  - loads of unusual shape or weight distribution are correctly slung
- test-lifting load just clear of lifting plane to allow for checks of crane computer (where fitted) to ensure:
  - load measuring equipment can be used to verify calculated weight of load
  - near capacity loads do not overload crane.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- appropriate workplace communication procedures, including:
  - listening
  - hand signals
  - questioning techniques
  - signage
  - two-way radios
  - written instructions
  - whistles
- crane configuration mathematical calculations to:

  - estimate loads
  - establish radius requirements
- relevant lifting gear to perform work/task
- characteristics and impact of factors affecting non-slewing articulated mobile crane stability whilst mobiling loads compared to slewing crane, including:
  - articulation of crane
  - correct tyre pressure (inflation/condition)
  - driving safely on public and private roadways
  - unique handling characteristics of a mobile articulated crane and the emergency procedures in the event of loss of control as per manufacturer recommendations
  - pick up and carry the load
  - side slope derations
- characteristics and impact of factors affecting vehicle loading crane stability whilst mobiling loads compared to slewing crane, including:
  - correct tyre pressure (inflation/condition)
  - emergency procedures in the event of incident
  - position of operator
  - use of stabilizers
- characteristics and impact of factors affecting reach stacker stability whilst mobiling loads compared to slewing crane, including:
  - correct tyre pressure (inflation/condition)
  - driving safely on roadways
  - emergency procedures in the event of an incident
  - impact of boom height and steering on stability
  - use of stabilisers
- crane, lifting gear load chart/s and manufacturer requirements
- lift impacting factors, including:
  - centre of gravity
  - dynamic nature of load
  - flex/deflexion of boom
  - length of load
  - radius of boom during lift
  - weight
- set-up of:
  - jib
  - fly jib
- hazards, including:
  - erection and pack-up
  - crane stability
  - ground stability and condition including recently filled trenches and slopes

    - insufficient lighting
    - obstacles or obstruction
    - other specific hazards and dangerous materials
    - overhead hazards, including:
        - electric lines
        - service pipes
        - structures
        - vegetation (trees)
    - traffic, including pedestrians, vehicles and other plant
    - operations on unusual, uneven or difficult terrains
- manufacturer requirements on outrigger procedures
- manufacturer requirements and instructions on shutting down and packing up crane
- mobile slewing crane characteristics and capabilities to allow crane configuration to suit a range of loads
- relevant workplace instructions, safety information and emergency procedures
- relevant documentation requirements and procedures for recording, reporting and maintaining workplace records and information
- risk assessment management and mitigation strategies, including hierarchy of control:
    - elimination
    - substitution
    - isolation
    - engineering controls
    - administrative controls
    - personal protective equipment (PPE)
- roles and responsibilities of duty holders in accordance with legislative obligations of WHS/OHS requirements, safe work and workplace procedures
- pre-start and operational checks required for a slewing mobile crane
- weather bureau forecasts and environmental conditions that could impact operation, including:
    - lightning
    - wind
    - water impacted ground
    - ultraviolet (UV) exposure
- problems and appropriate response procedures to unplanned and/or unsafe situations and environmental conditions
- hazards commonly encountered while preparing load:
    - instability of landing surfaces
    - overhead and underground hazards
    - insufficient lighting
    - traffic
    - weather

  - pedestrian traffic
  - work at heights
- selection, inspection, care, handling, application, limitations and storage of lifting equipment and gear:
  - flexible steel wire rope (FSWR) sling
  - synthetic sling
  - chain sling (including shortener)
  - spreader bar or lifting beam
  - tag line
  - shackles
  - eyebolts
  - plate clamps
- methods of making temporary connections to loads using fibre and synthetic ropes:
  - single sheet bend
  - clove hitch
  - rolling hitch
  - bowline
- stability of load and avoidance of hazards, including:
  - allowing for boom deflection
  - boom/jib as low as possible
  - carrying load near to ground surface
  - crane stability
  - gently accelerating and braking on slew/boom to minimise load swing
  - lowering load safely onto appropriate dunnage taking into consideration swing and restrictions of area
  - minimum boom/jib length
  - minimum speed
  - using handheld tag lines as required
  - identification of incorrect sling of load
- starting procedure of crane in accordance with manufacturer requirements
- workplace standards, requirements, policies and procedures for conducting safe work operations for the mobile slewing crane
- work area suitability based on relevant ground reports, including:
  - backfilled ground
  - bitumen
  - concrete
  - hard compacted soil
  - pre-contaminated soils
  - rock
  - rough, uneven ground

- soft soils.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

- Simulators must not be used in the assessment of this unit of competency.

Resources for assessment must include access to:

- slewing mobile crane with a Maximum Rated Capacity (MRC) of between 7 tonnes to 20 tonnes in safe/serviceable working order in accordance with manufacturer specifications
- appropriate loads as outlined in the performance evidence requirements
- appropriate personnel to sling and direct loads including:
  - licenced dogger or rigger
- communications equipment including:
  - two-way radios
  - whistles
- relevant personal protective equipment (PPE)
- relevant documentation for operating a slewing mobile crane with an MRC up to 20 tonnes, including:
  - approved codes of practice and relevant guidance material
  - relevant Australian technical standards
  - manufacturer guidelines (instructions, requirements or checklists), relevant industry standards and operating procedures (where applicable).

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

TLILIC0024 Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)

Modification History

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit specifies the skills and knowledge required to safely operate a vehicle loading crane with a Maximum Rated Capacity (MRC) of 10 metre tonnes or more. Competence in this unit, does not in itself result in a High-Risk Work Licence (HRWL) to operate this plant.

Vehicle loading crane means a crane mounted on a vehicle for loading and unloading the vehicle.

A person performing this work is required to hold a vehicle loading crane HRWL.

This unit requires a person operating a slewing vehicle loading crane with a MRC of 10 metre tonnes or more to:

- plan for the work/task
- prepare for the work/task
- perform work/task
- pack up.

Licensing/Regulatory Information

Legislative and regulatory requirements are applicable to this unit of competency.

This unit is based on the licensing requirements of Part 4.5 of the Model Work Health and Safety (WHS) regulations and meets Commonwealth, state and territory HRWL requirements.

The National Assessment Instrument (NAI) is the mandated assessment for the HRWL to operate the relevant licencing class as detailed in this unit.

Pre-requisite Unit

Not applicable.

Competency Field

LIC - Licencing Units.

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan work/task	**1.1** Task requirements are identified from work orders or equivalent, a lift plan is confirmed with associated personnel and a site inspection is conducted in accordance with workplace procedures
	1.2 Work area operating surface is confirmed to determine the quality of ground suitability for operational use of vehicle loading crane in accordance with workplace procedures
	1.3 Vehicle loading crane Rated Capacity (RC) and the lifting gear Working Load Limit (WLL) are established for the load/s and work/task requirements in accordance with manufacturer requirements and workplace procedures
	1.4 Appropriate paths for operating the vehicle loading crane and moving and placing load/s in work area are assessed and determined in accordance with workplace procedures
	1.5 Relevant hazard identification and risk elimination/control measures are applied and advised to relevant personnel in accordance with workplace procedures
	1.6 Traffic management plan implementation is confirmed and followed in accordance with workplace procedures
	1.7 Appropriate communication procedures are identified and tested with associated personnel in accordance with workplace procedures
	1.8 All tasks are confirmed to ensure requirements for the relevant work area in accordance with workplace procedures

	1.9	Information required to ensure that lifting equipment and gear inspection, use, maintenance and storage complies with manufacturer requirements is obtained and interpreted
Prepare for work/task	**2.1**	Consultation with workplace personnel is established and maintained to ensure all crane and lifting operations are clear and consistent with site requirements in accordance with a lift plan and workplace procedures
2	**2.2**	Risk control measures for hazards identified are checked for implementation in accordance with the lift plan and safe work procedures
	2.3	Vehicle loading crane controls are accessed safely in accordance with manufacturer requirements and safe work procedures
	2.4	Pre-start vehicle loading crane checks are carried out and any damage and defects are reported, recorded and appropriate action is taken in accordance with safe work procedures and manufacturer requirements
	2.5	Vehicle loading crane is set up correctly with any lifting gear as per the lift plan and in accordance with relevant manufacturer requirements, including load chart/s and safe work procedures
	2.6	Boom/jib and lifting gear are set up, as required, in accordance with specific manufacturer requirements and safe work procedures
	2.7	Vehicle loading crane is stabilised appropriately in accordance with the lift plan, relevant manufacturer requirements and safe work procedures
	2.8	Operational checks are carried out and any damage and defects are reported, recorded and appropriate action is taken in accordance with manufacturer requirements and safe work procedures
	2.9	Vehicle loading crane logbook is inspected and is correct for the crane type, is completed and signed, and required rectifications have been signed off in accordance with manufacturer requirements and safe work procedures
	2.10	Weather and work environment conditions are assessed to determine any impact on vehicle loading crane operations in accordance with manufacturer requirements and safe work procedures

	2.11	Weight of load is identified, calculated or estimated
	2.12	Derated WLL of lifting equipment resulting from selected slinging techniques is calculated
	2.13	Suitable lifting points and slinging techniques are identified
	2.14	Lifting equipment and gear is prepared for safe use
	2.15	Load destination is confirmed for stability ensuring it is able to bear the load and is prepared for safe access and landing
3 **Perform work/task**	**3.1**	Lifts are determined within the RC of the vehicle loading crane in accordance with the load chart/s and lift plan
	3.2	Boom/jib and hook block are safely positioned over the load following directions from associated personnel where applicable and in accordance with the lift plan and safe work procedures
	3.3	Lifting equipment and gear are connected to the load and used safely in accordance with the lift plan, safe work procedures and manufacturer requirements
	3.4	Test lift is carried out in accordance with safe work procedures
	3.5	Loads are transferred using relevant crane movements and tag lines, as required, in accordance with lift plan and safe work procedures
	3.6	Load and crane movement is monitored constantly and crane is operated safely in accordance with lift plan and safe work procedures
	3.7	All required communication signals are correctly interpreted and followed whilst crane is operated in accordance with the lift plan and safe work procedures

	3.8	Load is lowered and landed safely in accordance with lift plan and safe work procedures
	3.9	Lifting gear is disconnected from load and crane is positioned safely and efficiently for next task in accordance with lift plan and safe work procedures
	3.10	Lifting equipment and gear are inspected for defects, and defective items are isolated, tagged and reported
4 Pack up	**4.1**	Crane boom/jib, lifting gear and associated equipment are stowed and secured as required in accordance with manufacturer requirements and safe work procedures
	4.2	Relevant motion locks and brakes are applied as required in accordance with manufacturer requirements and safe work procedures
	4.3	Stabilisers are stowed and secured in accordance with manufacturer requirements and safe work procedures
	4.4	Crane is shut down and secured to prevent unauthorised access/use in accordance with safe work procedures
	4.5	Plates or packing are stowed and secured in accordance with safe work procedures
	4.6	Shutdown crane checks are carried out in accordance with safe work procedures and manufacturer requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the TLI Transport and Logistics Training Package

Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC0002 Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above).

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

Assessment Requirements for TLILIC0024 Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)

Modification History

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and include:

- applying relevant communication signals from associated personnel
- applying relevant crane movements, including:
  - boom/jib up and down (luffing)
  - catching load swing appropriately
  - positioning and using main hook and lifting gear to connect to load safely
  - raise and lower hoist
  - slew boom/jib
  - telescope in and out
- applying relevant mathematical calculations in conjunction with lift plan and load chart to determine radius requirements and relevant lifting gear to perform work/task to enable crane to be configured for load, including:
  - boom
  - stabiliser positioning
  - type of hook
- carrying out operational checks ensuring:
  - all controls are located, identified and tested for functionality
  - all hydraulic functions are operational
  - lifting gear movements and control functions are smooth and comply with lift plan
  - hazard warning systems, safety, audible and visual warning devices are checked to ensure they are functional, including:
    - reversing beepers
    - lights
    - horns
  - start-up is in accordance with manufacturer requirements and safe work procedures
  - there are no unusual noises
  - crane control functions comply with operating requirements
- communicating with other associated personnel through using appropriate worksite procedures, including:

  - two-way radio
  - active listening
  - demonstrating and interpreting hand signals
  - questioning to confirm understanding
  - signage
  - whistles
  - written instructions
- completing pre-start checks, including:
  - engine/mechanical fluid level checks as required by manufacturer requirements
  - presence of correct logbook
  - evidence of damage
  - fluid leaks
  - lights work effectively
  - locating, identifying and confirming all controls
  - fire extinguisher
  - safety equipment checks
  - signage and labels to ensure they are visible and legible
  - checking for signs of paint separation and stressed welds indicating potential structural weakness
  - tyres and wheels for damage/wear and correct inflation
  - updating records as required
  - visual damage or equipment faults
- complying with Commonwealth, state and territory work health and safety (WHS)/occupational health and safety (OHS) legislation
- conducting and applying risk and hazard assessment strategies, including:
  - confirming work area operating surface suitability based on crane and task requirements
  - dynamic loads
  - ground conditions, including condition of surface and slopes
  - load swing
  - overloading
  - lifting and placing load
  - tyre pressures and tyre condition
  - asymmetric loads
  - overhead hazards, including electric lines and service pipes
  - restricted and poorly ventilated areas
  - risk of collision with people, moving plant and fixed structures
  - adequate lighting
  - traffic, including pedestrians, vehicles and other plant
  - weather conditions
- confirming and following traffic management plan procedure relevant to their role in the

work area

- identifying hazards and using appropriate risk controls and safety measures and equipment relevant to slinging loads
- selecting and inspecting appropriate lifting gear and applying slinging techniques appropriate to the type of load, its mass and centre of gravity
- identifying the Working Load Limit (WLL) tags of the lifting equipment and gear and calculating the deration of the WLL resulting from the slinging techniques applied
- using lifting gear, including flexible steel wire rope (FSWR) sling, synthetic sling, chain sling (including shortener), spreader bar or lifting beam, tag line, shackles and eyebolts, and using bends and hitches when slinging, including:
  - single sheet bend
  - clove hitch
  - bowline
- determining any defects or faults with operation of crane and reporting to relevant person/s
- ensuring risk control measures within the work area are effective in accordance with workplace procedures
- identifying, isolating and tagging out defective lifting equipment, and reporting to authorised person/s
- interpreting and confirming relevant documentation for the work task and relevant area
- maintaining three points of contact whilst accessing load surface area of vehicle loading crane and ensure rungs/steps are free of hazards
- monitoring load disconnection from hook is safe and ensuring no movement of controls or the load
- operating a vehicle loading crane configured to its Rated Capacity (RC) of 10 metre tonnes or more to lift and move four different loads using the main hook through an obstacle course using all crane operational controls while the load is in full view of the crane operator. Loads must consist of:
  - a load of >50% of the RC of the crane with a boom length of >75%, and
  - a round load with a minimum length of 3 metres and minimum weight of at least 200 kg, and
  - an asymmetrical load, and
  - stillage or cage containing loose items with a minimum weight of at least 200 kg
- positioning the vehicle loading crane for safe operation for:
  - application of the task
  - manoeuvring in the workplace
  - stability of the vehicle loading crane and the load
- positioning vehicle loading crane in relevant area for next task
- recording and maintaining accurate information relating to crane operations
- reporting to relevant person/s on site risk control measures that are not in place or deficient
- setting up and validating an exclusion zone
- shutting down a vehicle loading crane in accordance with manufacturer requirements and safe work procedures
- stabilising a vehicle loading crane for operation by:

  - correctly positioning plates or packing
  - deploying stabilisers
  - establishing correct size plates or packing in accordance with lift plan
  - levels are checked
- test-lifting load just clear of lifting plane to allow for checks to be safely made to ensure:
  - slinging is correct
  - all crane equipment is functioning properly
  - load centre of gravity is correct
  - loads of unusual shape or weight distribution are correctly slung
- using communications signals, including:
  - hoist down - hand and whistle and radio
  - hoist up - hand and whistle and radio
  - luff boom down - hand and whistle and radio
  - luff boom up - hand and whistle and radio
  - slew left - hand and whistle and radio
  - slew right - hand and whistle and radio
  - stop - hand and whistle and radio
  - telescope in - hand and whistle and two-way radio (where manufacturer requirements allow)
  - telescope out - hand and whistle and two-way radio (where manufacturer requirements allow).

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- appropriate worksite communication procedures, including:
  - listening
  - hand signals
  - questioning techniques
  - signage
  - two-way radios
  - written instructions
  - whistles
- characteristics and impact of factors affecting vehicle loading crane stability whilst moving loads, including:
  - overloading
  - poor load placement
  - asymmetric loads
  - tyre deflation/condition

- crane, lifting gear load chart/s and manufacturer requirements
- hazards, including:
  - pack up and crane stability, crane tipping and demolition sites
  - ground stability, including ground condition, recently filled trenches and slopes
  - insufficient lighting
  - obstacles or obstruction
  - other specific hazards and dangerous materials
  - overhead hazards, including:
    - electric lines
    - service pipes
    - fixed structures
    - vegetation (trees)
  - traffic, including pedestrians, vehicles and other plant
  - operations on unusual, uneven or difficult terrains
- lift impacting factors, including:
  - centre of gravity
  - dynamic nature of load
  - flex/deflexion of load
  - length
  - radius of lift
  - weight
- manufacturer requirements on stabiliser procedures
- manufacturer requirements and instructions on shutting down and packing up crane
- mathematical calculations to:
  - estimate loads
  - establish radius requirements
  - determine relevant lifting gear to perform work/task
- pre-start and operational checks required for a vehicle loading crane
- problems and appropriate response procedures to unplanned and/or unsafe situations and environmental conditions
- relevant documentation requirements and procedures for recording, reporting and maintaining workplace records and information
- relevant workplace instructions, safety information and emergency procedures
- risk assessment management and mitigation strategies, including hierarchy of control:
  - elimination
  - substitution
  - isolation
  - engineering controls
  - administrative controls
  - personal protective equipment (PPE)

- roles and responsibilities of duty holders in accordance with legislative obligations of WHS/OHS requirements and safe work/workplace procedures
- hazards commonly encountered while slinging:
  - instability of landing surfaces
  - overhead and underground hazards
  - insufficient lighting
  - traffic
  - weather
  - pedestrian traffic
  - work at heights
- selection, inspection, care, handling, application, limitations and storage of lifting equipment and gear:
  - Flexible Steel Wire Rope (FSWR) sling
  - synthetic sling
  - chain sling (including shortener)
  - spreader bar or lifting beam
  - tag line
  - shackles
  - eyebolts
- methods of making temporary connections to loads using fibre and/or synthetic ropes:
  - single sheet bend
  - clove hitch
  - bowline
- stability of load and avoidance of hazards, including:
  - allowing for boom deflection
  - boom/jib as low as possible
  - crane stability
  - gently accelerating and braking on slew/boom to minimise load swing
  - lowering load safely onto appropriate dunnage taking into consideration swing and restrictions of area
  - minimum boom/jib length
  - minimum speed
  - using handheld tag lines as required
  - identification of incorrect sling of load
- starting procedure of crane in accordance with manufacturer requirements
- set-up of:
  - jib
  - fly jib (where fitted)
- vehicle loading crane characteristics and capabilities to allow crane configuration to suit a range of loads
- weather bureau forecasts and environmental conditions that could impact operation,

including:

- lightning
- wind
- water impacted ground
- ultraviolet (UV) exposure

- work area suitability based on relevant ground reports, including:
  - backfilled ground
  - bitumen
  - concrete
  - hard compacted soil
  - pre-contaminated soils
  - rock
  - rough, uneven ground
  - soft soils
- workplace standards, requirements, policies and procedures for conducting operations for the vehicle loading crane.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

- Simulators must not be used in the assessment of this unit of competency.

Resources for assessment must include access to:

- vehicle loading crane with a RC of 10 metre tonnes or more in safe/serviceable working order in accordance with manufacturer specifications
- appropriate loads as outlined in the Performance Evidence requirements
- communication equipment, including:
  - two-way radios
  - whistles
- relevant personal protective equipment (PPE)
- relevant documentation for operating a vehicle loading crane with an RC of 10 metre tonnes or more, including:

- approved codes of practice and relevant guidance material
- relevant Australian technical standards
- manufacturer guidelines (instructions, requirements or checklists), relevant industry standards and operating procedures (where applicable).

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

TLILIC2015 Licence to drive a medium rigid vehicle

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package.

Modification of assessment conditions to remove an implementation barrier.

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit involves the skills and knowledge required to obtain a licence to drive a medium rigid vehicle. It includes systematically and efficiently controlling all vehicle functions, monitoring traffic and road conditions, managing vehicle condition and performance, and effectively managing hazardous situations.

Types of medium rigid vehicles include:

- two axle rigid trucks, not being a prime mover, above 8 tonnes GVM or
- a two axle bus above 8 tonnes GVM.

Assessment of this unit will be undertaken within a licensing examination conducted by, or under the authority of, the relevant state/territory driver licensing authority.

This unit applies to driving that is carried out in accordance with relevant state/territory driver licensing authority licence requirements and regulations for medium rigid vehicles.

Driving is performed with limited or minimum supervision, and with limited accountability and responsibility for self and others in achieving the prescribed outcomes.

Driving involves the application of routine vehicle driving principles and procedures to maintain safety and to operate a medium rigid vehicle across a variety of driving contexts.

The primary legislative requirements applicable to this unit of competency are state/territory legislation in relation to road use and driver licensing.

This unit addresses the knowledge and skills necessary for the granting of a Medium Rigid Driver Licence.

Being awarded this unit of competency is a necessary requirement to obtain a Medium Rigid Driver Licence but is only one of several criteria. Prospective licence applicants should check with the state/territory driver licensing authority for other criteria (such as licence tenure and medical fitness) to confirm other eligibility requirements before undertaking training and/or assessment.

Pre-requisite Unit

Not applicable.

Competency Field

LIC – Licensing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Drive a medium rigid vehicle	1.1 Medium rigid vehicle is started, steered, manoeuvred, positioned and stopped in accordance with traffic regulations, manufacturer instructions and relevant vehicle handling procedures
	1.2 Engine power is managed to ensure efficiency and performance, and to minimise engine and transmission damage
	1.3 Braking system of medium rigid vehicle is managed and operated efficiently to ensure effective control of vehicle under all conditions
	1.4 Driving hazards are identified and/or anticipated and avoided or controlled through defensive driving
	1.5 Medium rigid vehicle is driven in reverse, maintaining visibility and achieving accurate positioning
	1.6 Medium rigid vehicle is parked, shutdown and safely secured according to traffic regulations
	1.7 Load is safely and effectively restrained
2 Monitor traffic and road conditions	2.1 Traffic and road conditions are constantly monitored and acted on to enable safe operation and to ensure no injury to people or damage to property, equipment, loads and facilities
	2.2 Interaction with other road users is conducted courteously in accordance with road rules to ensure safe and efficient traffic flow
3 Monitor and	3.1 Vehicle performance is maintained through pre-operational

maintain vehicle performance		inspections and vehicle checks
	3.2	Appropriate signage, lights and equipment are checked for operational effectiveness and for conformity to prescribed traffic regulations

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions can be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit is equivalent to TLILIC2015B Licence to drive a medium rigid vehicle.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

Assessment Requirements for TLILIC2015 Licence to drive a medium rigid vehicle

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package.

Modification of assessment conditions to remove an implementation barrier.

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- anticipating and monitoring traffic hazards and taking appropriate action
- applying precautions and required action to eliminate, minimise or control identified hazards
- applying relevant procedures that reflect legislative requirements
- carrying out pre-operational vehicle checks including:
  - checking and topping up fluid levels
  - checking:
    - brakes
    - operation of vehicle lights and indicators
    - tyre pressures
  - visually checking vehicle
- communicating effectively with others
- handling vehicle including:
  - accelerating and braking
  - managing engine performance
  - operating vehicle controls, instruments and indicators
  - positioning and stopping a vehicle
  - reversing a vehicle
  - starting a vehicle
  - steering and manoeuvring a vehicle
  - using defensive driving techniques
- negotiating a range of complex traffic infrastructure (such as roundabouts, traffic lights, stalemate intersections, railway level crossings)
- reading and interpreting relevant instructions, procedures, information and signs.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- driving hazards and related defensive driving techniques
- efficient driving techniques
- engine power management and safe driving strategies
- medium rigid vehicle controls, instruments and indicators, and their use
- medium rigid vehicle handling procedures
- pre-operational checks carried out on vehicle and related action
- relevant state/territory driver licensing authority road rules, regulations, permit and licence requirements.

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the *Standards for Registered Training Organisations* current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the *Standards for Registered Training Organisations* current at the time of assessment.

Practical driving aspects must be assessed in a vehicle typical of the class as approved by the state/territory driver licensing authority. The use of simulators for driver testing is not permitted.

The assessor must use the mandatory assessment tool provided by the state/territory driver licensing authority to conduct the assessment for this unit, in accordance with licensing authority requirements.

The state/territory driver licensing authority may prescribe approved routes, which must be used for the final assessment.

Assessment must occur in the following traffic and road conditions:

- on open and/or private roads with moderate inclines and declines
- typical weather conditions.

and may also include traffic and road conditions at a depot, base or warehouse.

Resources for assessment include:

- a range of relevant exercises, case studies and/or simulations
- appropriate range of relevant on-road operational or workplace situations
- applicable documentation including workplace procedures, regulations, codes of practice and operation manuals
- relevant materials, tools, equipment and personal protective equipment currently used in industry.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

TLILIC2016 Licence to drive a heavy rigid vehicle

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package.

Modification of assessment conditions to remove an implementation barrier.

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit involves the skills and knowledge required to obtain a licence to drive a heavy rigid vehicle. It includes systematically and efficiently controlling all vehicle functions, monitoring traffic and road conditions, managing vehicle condition and performance, and effectively managing hazardous situations.

Heavy rigid vehicle includes:

- a rigid vehicle, not being an unladen prime mover, with a minimum of three axles and a minimum 15 tonnes GVM or
- a modified three axle prime mover with a certified detachable tray (with capacity to carry 75% of its specified GVM) with a GVM of 15 tonnes and holds dual registration (HC & HR) or
- a three axle articulated bus or
- a three axle bus above 15 tonnes GVM.

Assessment of this unit will be undertaken within a licensing examination conducted by, or under the authority of, the relevant state/territory driver licensing authority.

This unit applies to driving that is carried out in accordance with relevant state/territory driver licensing authority licence requirements and regulations for heavy rigid vehicles.

Driving is performed with limited or minimum supervision, and with limited accountability and responsibility for self and others in achieving the prescribed outcomes.

Driving involves the application of routine vehicle driving principles and procedures to maintain safety and to operate a heavy rigid vehicle across a variety of driving contexts.

The primary legislative requirements applicable to this unit of competency are state/territory legislation in relation to road use and driver licensing.

This unit addresses the knowledge and skills necessary for the granting of a Heavy Rigid Driver Licence.

Being awarded this unit of competency is a necessary requirement to obtain a Heavy Rigid Driver Licence but is only one of several criteria. Prospective licence applicants should check with the state/territory driver licensing authority for other criteria (such as licence tenure and medical fitness) to confirm other eligibility requirements before undertaking training and/or

assessment.

Pre-requisite Unit

Not applicable.

Competency Field

LIC – Licensing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Drive a heavy rigid vehicle	1.1 Heavy rigid vehicle is started, steered, manoeuvred, positioned and stopped in accordance with traffic regulations, manufacturer instructions and relevant vehicle handling procedures
	1.2 Engine power is managed to ensure efficiency and performance, and to minimise engine and gear damage
	1.3 Braking system of heavy rigid vehicle is managed and operated efficiently to ensure effective control of vehicle under all conditions
	1.4 Driving hazards are identified and/or anticipated and avoided or controlled through defensive driving
	1.5 Heavy rigid vehicle is driven in reverse, maintaining visibility and achieving accurate positioning
	1.6 Heavy rigid vehicle is parked, shutdown and safely secured according to traffic regulations
	1.7 Load is safely and effectively restrained
2 Monitor traffic and	2.1 Traffic and road conditions are constantly monitored and acted on to enable safe operation and to ensure no injury to

	road conditions		people or damage to property, equipment, loads and facilities
		2.2	Interaction with other road users is conducted courteously in accordance with road rules to ensure safe and efficient traffic flow
3	**Monitor and maintain vehicle performance**	3.1	Vehicle performance is maintained through pre-operational inspections and vehicle checks
		3.2	Appropriate signage, lights and equipment are checked for operational effectiveness and for conformity to prescribed traffic regulations

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions can be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC2016B Licence to drive a heavy rigid vehicle.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

Assessment Requirements for TLILIC2016 Licence to drive a heavy rigid vehicle

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package.

Modification of assessment conditions to remove an implementation barrier.

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- anticipating and monitoring traffic hazards and taking appropriate action
- applying precautions and required action to eliminate, minimise or control identified hazards
- applying relevant procedures that reflect legislative requirements
- carrying out pre-operational vehicle checks including:
  - checking and topping up fluid levels
  - checking:
    - brakes
    - operation of vehicle lights and indicators
    - tyre pressures
  - visually checking vehicle
- communicating effectively with others
- handling vehicle including:
  - accelerating and braking
  - managing engine performance
  - operating vehicle controls, instruments and indicators
  - positioning and stopping a vehicle
  - reversing a vehicle
  - starting a vehicle
  - steering and manoeuvring a vehicle
  - using defensive driving techniques
- negotiating a range of complex traffic infrastructure (such as roundabouts, traffic lights, stalemate intersections, railway level crossings)
- reading and interpreting relevant instructions, procedures, information and signs.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- driving hazards and related defensive driving techniques
- efficient driving techniques
- engine power management and safe driving strategies
- heavy rigid vehicle controls, instruments and indicators, and their use
- heavy rigid vehicle handling procedures
- pre-operational checks carried out on vehicle and related action
- relevant state/territory driver licensing authority road rules, regulations, permit and licence requirements.

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the *Standards for Registered Training Organisations* current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the *Standards for Registered Training Organisations* current at the time of assessment.

Practical driving aspects must be assessed in a vehicle typical of the class as approved by the state/territory driver licensing authority. The use of simulators for driver testing is not permitted.

The assessor must use the mandatory assessment tool provided by the state/territory driver licensing authority to conduct the assessment for this unit according to licensing authority requirements.

The state/territory driver licensing authority may prescribe approved routes, which must be used for the final assessment.

Assessment must occur in the following traffic and road conditions:

- on open and/or private roads with moderate inclines and declines
- typical weather conditions.

and may also include traffic and road conditions at a depot, base or warehouse.

Resources for assessment include:

- a range of relevant exercises, case studies and/or simulations
- appropriate range of relevant on-road operational or workplace situations
- applicable documentation including workplace procedures, regulations, codes of practice and operation manuals
- relevant materials, tools, equipment and personal protective equipment currently used in industry.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply work health and safety (WHS)/occupational health and safety (OHS) regulations and codes of practices in the electrotechnology workplace.

It includes applying safe working practices, following workplace procedures for hazard identification and risk control. It also includes electrotechnology worker responsibilities and application for health and safety, risk management and adherence to safety practices as part of electrotechnology work functions when preparing to enter a work area.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to enter an electrotechnology workplace	**1.1** Work area access permits are obtained from appropriate person/s in accordance with workplace procedures

	1.2	Relevant workplace WHS/OHS safety regulations and codes of practices are identified and followed when entering the electrotechnology work area
	1.3	Safe work methods for controlling risks are obtained, read and applied prior to undertaking work activity in accordance with WHS/OHS workplace procedures
	1.4	Preparation for electrical and non-electrical isolation is carried out to prevent creation of hazards from loss of machine/system/process control in accordance with WHS/OHS workplace procedures
	1.5	Tools, equipment and chemicals required for the electrotechnology work are checked for safety and correct functionality in accordance with workplace procedures and regulatory requirements
	1.6	Personal protective equipment (PPE) is worn appropriate to the electrotechnology work area and in accordance with workplace procedures
2 Apply safe electrotechnology working practices	**2.1**	Risk control work measures are implemented in accordance with WHS/OHS workplace procedures
	2.2	Procedures for dealing with accidents, fires and emergencies are followed in accordance with workplace procedures, scope of responsibility and capabilities
	2.3	Safe work methods are applied when working at heights including safe and effective use of safety equipment
	2.4	Safe work methods are used when undertaking lifting, lowering, pushing, pulling, carrying or otherwise moving, holding or restraining workplace tasks in accordance with relevant code of practice
	2.5	Safe work methods for removing an electric shock victim from a live electrical situation are demonstrated in accordance with workplace emergency management procedures
	2.6	Working area is kept clean, neat and tidy in accordance with workplace housekeeping procedures
3 Follow electrotechnology workplace procedures for hazard identification and	**3.1**	Hazards are identified, control measures implemented and reviewed through regular active participation in the consultation process with employer and other employees

risk control

3.2 Hazards in the work area are identified and reported to relevant person/s in accordance with workplace procedures

3.3 WHS/OHS documentation and incident records are completed in accordance with regulatory requirements and workplace procedures

3.4 Workplace instructions are followed in accordance with regulatory requirements and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) regulations, legislation, codes of practices and procedures in the workplace, including:
  - identifying typical hazards associated with work environments and assessing risk/s in an electrotechnology workplace
  - applying and reviewing risk control measures to minimise, control or eliminate identified hazards
  - reporting hazards to relevant person/s
  - applying safe working practices/methods
  - contributing to WHS/OHS consultative processes
- following relevant workplace emergency management procedures and instructions relating to WHS/OHS and emergency incidents
- selecting and using appropriate personal protective equipment (PPE)
- applying correct manual handling techniques
- confirming (safe) isolation of an electrical supply and isolation of potential electrical and non-electrical hazards has been completed by an authorised person
- demonstrating safe methods of removing an electric shock victim from a live electrical situation
- selecting an appropriate ladder for a given situation and performing a safety check before use
- completing relevant WHS/OHS documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- effective verbal and written communication techniques
- electrotechnology work environment, including:
  - appropriate fire extinguisher for a given type of fire
  - commonly used workplace safety signs

  - relevant industry standard for safe workplace procedures
  - risk assessment documentation
  - typical hazards associated with a range of work environments
  - use of fire extinguishers
  - housekeeping and potential hazards in relation to improper housekeeping
  - workplace procedures used to control the risks associated with workplace hazards
- legal requirements relevant to WHS/OHS in the workplace, including:
  - appropriate personal protective equipment (PPE)
  - asbestos awareness and reporting hazardous gases, including supervisory requirements and duty of care
  - difference between hazards and risks
  - duty holder responsibilities, as specified in WHS/OHS Acts, regulations and codes of practice
  - employer and employee responsibilities, rights and obligations
  - general aims and objectives of the relevant state or territory legislation relating to WHS/OHS
  - hazards that may be present in the electrotechnology workplace, the harm they can cause and how this harm occurs
  - housekeeping and potential hazards in relation to improper housekeeping
  - major functions of safety committees and representatives
  - powers of health and safety inspectors
  - relevant WHS/OHS regulations, codes and practices
  - underlying principles of WHS
- life support - cardiopulmonary resuscitation (CPR) in the workplace, including:
  - first aid
  - responsibilities of the first aider
  - priorities of first aid management for any accident or injury
  - procedures required at an accident scene
  - legal and ethical issues, which may impact on the management of care
  - 'duty of care'
  - examination of a casualty for injuries
  - effect of cardiopulmonary arrest on the body
  - managing simulated conditions of airway obstruction, respiratory arrest and cardiopulmonary arrest
  - single and two-person CPR
  - signs and symptoms of an altered level of consciousness
  - management of simulation of a casualty with an altered level of consciousness
  - signs and symptoms of shock
  - management of simulation of a casualty in shock
- relevant safe work method statements (SWMS)/job safety analysis (JSA) or risk mitigation processes, including:

- emergency management plan
- hierarchy of WHS/OHS hazard risk control measures
- principles of risk assessment/management and required documentation

- typical hazards associated with electrotechnology work environments and their control, including:
  - asbestos, including:
    - common types of asbestos containing building materials
    - warning signs used to identify the presence of asbestos
    - effects of asbestos on the human body
    - requirements for reporting the presence of asbestos
  - silica, including:
    - types of materials that contain crystalline silica (silica dust)
    - methods of releasing silica dust
    - recommended levels of exposure to crystalline silica
    - effects of crystalline silica on the human body
  - hazardous gases
  - chemicals in the workplace, including:
    - hazardous substances and dangerous goods and their classifications
    - labelling and storage requirements for chemicals
    - purpose and interpretation of safety data sheets (SDS)/material safety data sheets (MSDS)
  - confined spaces, including:
    - control measures for working in a designated confined space
    - hazards associated with working in a confined space
    - workplace situations that could be classified as a confined space
  - physical and psychological hazards, including excessive noise, vibration, thermal stress, radiation, lasers, occupational overuse syndrome, stress, drugs and alcohol
  - safe manual handling principles, including:
    - procedures and methods for manual handling
    - situations that may cause manual handling injuries
    - types of manual handling injuries and their effect
  - working at heights, including:
    - hazards and precautions associated with working on ladders, elevated work platforms (EWP) and scaffolds
    - identification of work area as a height risk and use appropriate safety equipment to prevent a fall
  - working safely with electricity, including:
    - effects of electric shock on the human body
    - protection offered by a residual current device (RCD)
    - need for ensuring the (safe) isolation of an electrical supply

- appropriate method of removing an electric shock victim from a live electrical situation
- precautions that can minimise the chance of electric shock (earthing, extra-low voltage (ELV), fuses, circuit breakers and RCDs)
- common causes of electrical accidents.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, emergency management plan, equipment specifications, regulations, codes of practice and operation manuals
- relevant WHS/OHS legislation, regulations and codes of practice related to hazards management in the electrotechnology industry and workplace.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEECD0019 Fabricate, assemble and dismantle utilities industry components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fabricate, assemble and dismantle utilities industry components using fitting and metal fabrication techniques.

It includes the safe use of hand tools, fixed and portable power tools; cutting, shaping, joining and fixing; using metallic and non-metallic materials; dismantling and assembling equipment; mechanical measurement and marking out; and, reading drawings/diagrams.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for dismantling, assembling and fabrication work	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified and applied in accordance with workplace procedures

	1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3	Work instructions and relevant workplace procedures, industry standards, codes of practice and regulations for dismantling, assembling and fabrication are identified and applied
	1.4	Scope of work to be undertaken is obtained from relevant documentation and from work supervisor
	1.5	Advice is sought from work supervisor to ensure work is coordinated effectively with other persons
	1.6	Materials required for work are identified and obtained in accordance with workplace procedures
	1.7	Tools, equipment and measuring devices needed to carry out the work are obtained and checked for correct operation and safety
2 Dismantle and assemble utilities industry apparatus	**2.1**	WHS/OHS risk control measures and workplace procedures for dismantling and assembling apparatus are followed
	2.2	Circuits/apparatus/plant are checked and isolation confirmed in accordance with WHS/OHS workplace requirements and procedures
	2.3	Relevant tools are selected and used correctly and safely in accordance with manufacturer instructions and workplace procedures
	2.4	Relevant manufacturer guides and instructions are followed when dismantling and assembling apparatus
	2.5	Apparatus components are marked or tagged correctly during dismantling to ensure correct and efficient reassembly in accordance with workplace procedures
	2.6	Dismantled components and parts are stored to protect them against loss or damage in accordance with manufacturer instructions and workplace procedures
	2.7	Apparatus is dismantled and assembled without waste of materials and energy, damage to apparatus, the surrounding environment or services
	2.8	Unplanned events are referred to supervisor for

		directions in accordance with workplace procedures
	2.9	Quality checks are carried out in accordance with workplace procedures
	2.10	Worksite is tidied, tools and equipment cleaned and securely stored in accordance with workplace procedures
	2.11	Work supervisor is notified of dismantling and assembling apparatus completion in accordance with workplace procedures
3 Fabricate utilities industry components	**3.1**	WHS/OHS risk control measures and workplace procedures for fabricating components are followed
	3.2	Circuits/apparatus/plant are checked and isolated in accordance WHS/OHS workplace requirements and procedures
	3.3	Relevant tools and equipment are selected, used correctly and safely in accordance with manufacturer instructions and workplace procedures
	3.4	Drawings, diagrams and instructions for fabrication of mechanical components are followed in accordance with workplace procedures
	3.5	Component dimensions are determined directly by measuring, or by calculation from information supplied in job drawings and instructions
	3.6	Mechanical components are fabricated by measuring, marking out, cutting, joining and fixing accurately using relevant equipment and tools, minimising waste of materials and energy and/or damage to the surrounding environment or services
	3.7	Unplanned events are referred to supervisor for directions in accordance with workplace procedures
	3.8	Quality checks are carried out in accordance with workplace procedures
	3.9	Worksite is tidied, tools and equipment cleaned and securely stored in accordance with workplace procedures
	3.10	Work supervisor is notified of fabrication completion in

accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Hand tools must include:	• drills and drilling with different types of drills used in the electrotechnology industry • tools for holding, cutting, driving, shaping, breaking and bending materials • tools for cutting metallic and non-metallic material
Relevant workplace policies and procedures must include:	• circuits/apparatus/plant isolation procedures • workplace referral and reporting procedures
Sheet metal work must include:	• application of a range of fabrication material types • use of tools for cutting, bending, folding and punching sheet metals
Tapping and threading must include:	• tools for cutting internal and external threads to materials used for electrotechnology work
Workshop planning processes and materials must include:	• metallic and non-metallic materials used in the electrotechnology industry and their application

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE102A Fabricate, assemble and dismantle utilities industry components.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEECD0019 Fabricate, assemble and dismantle utilities industry components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- applying sustainable energy work practices to reduce waste when marking out
- complying with relevant electrical regulations and legislations
- consulting with work supervisor
- correctly marking, tagging and storing components during dismantling
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- drawing freehand mechanical components showing all information needed for its manufacture/fabrication
- fabricating, dismantling, assembling utilities industry components, including:
  - applying safety procedures when using holding and cutting tools
  - cutting a thread on metallic components
  - demonstrating safe use of a bench drill
  - dismantling electrical, electronic, instrumentation or refrigeration/air conditioning piece of equipment using correct procedures
  - assembling electrical, electronic, instrumentation or refrigeration/air conditioning piece of equipment using correct procedures
  - drilling metallic and non-metallic components
  - fabricating components using sheet metal and fabrication tools
- following manufacturer guides and instructions
- following work instructions
- holding and cutting materials accurately
- interpreting and completing workplace documentation
- interpreting mechanical drawings/diagrams and instructions used in the electrotechnology industry
- joining components using correct method and equipment
- laying out a drawing of mechanical components using engineering drawing convention

- marking out, cut, bend, drill and join sheet metal
- measuring, calculating and marking out a project accurately in accordance with workplace procedures
- selecting and using portable power tools correctly and safely
- selecting and using relevant hand tools correctly and safely
- tapping and threading metallic and/or non-metallic components
- using vernier calipers and micrometers to measure components
- maintaining a clean worksite and equipment
- modifying metal enclosures
- demonstrating safe drilling practices
- modifying plastic enclosures
- performing quality checks
- planning for dismantling, assembling and fabrication work.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- mechanical drawing interpretation and sketching, including:
  - industry drawing standards of mechanical components
  - abbreviations and symbols used in drawing of mechanical components
  - interpretation of mechanical drawings commonly used in the electrotechnology industry (orthogonal projection, third angle - detail and assembly drawings, and pictorial views)
  - laying out a drawing of mechanical components using engineering drawing convention
  - freehand drawings of mechanical components showing all information needed for its manufacture/fabrication
- workshop planning and materials, including:
  - methods used to work safely in an industrial work environment
  - typical non-electrical hazards in the workplace
  - control measures for dealing with hazards identified
  - type of metallic and non-metallic materials used in the electrotechnology industry and application of the common materials
  - planning process
- measuring and marking out, including:
  - reasons for measuring and marking out
  - sustainable energy work practices related to reducing waste when marking out
- holding and cutting materials, including:
  - procedures for using a range of tools for cutting, shaping, and finishing metallic and non-metallic materials
  - safety procedures when using holding and cutting tools

- drills and drilling, including:
  - types of drills used in the electrotechnology industry
  - drilling metallic and non-metallic components
  - safe use of a bench drill
- tapping and threading including type and size of commonly used threads used in electrotechnology work
- general hand tools used in electrotechnology work
- joining techniques, including:
  - machine screws
  - welding, brazing or soldering techniques
- portable power tools in electrotechnology work, including:
  - applications of portable power tools
  - using portable power tools
  - fabricating components using power tools
  - requirements for testing and tagging cord connected electrical equipment
- compressed gas operated tools in electrotechnology work
- sheet metal work, including:
  - types of sheet metal materials used in the electrotechnology work
  - names and applications of the types of fabrication materials
  - techniques used in fabricating sheet metal, including cutting, bending, drilling/punching, joining and cutting mitres
  - marking out, cutting, bending, drilling and/or cutting and/or punching holes, joining and cutting mitred joints using sheet metal
  - sustainable energy work practices to reducing waste when fabricating using sheet metal
- low tolerance measurement, including:
  - tolerance
  - techniques in using vernier callipers and micrometers
- dismantling and assembly techniques, including procedures for ensuring the safe treatment of dismantled components
- relevant tools for specific tasks, including:
  - tapping and threading
  - general hand tools used in electrotechnology work
  - joining
  - portable electric power tools
  - dismantling and assembly techniques
  - measuring and marking out
  - holding and cutting metallic and non-metallic materials
  - sheet metal work

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEECD0044 Solve problems in multiple path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in multiple path circuits.

It includes working safely; applying problem-solving procedures, including the use of voltage, current and resistance measuring devices; and providing solutions derived from measurements and calculations to predictable problems in multiple path circuits.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0046 Solve problems in single path circuits

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on multiple path circuits	**1.1** Scope of work to be undertaken is determined from relevant documentation, electrical drawings or relevant person/s
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) workplace procedures for a given work

		area are identified and applied
	1.3	Electrical hazards are identified, risks are assessed, and control measures are implemented
	1.4	Advice is sought from the relevant person/s to ensure the work is coordinated effectively with others
	1.5	Materials required for work are identified and accessed in accordance with workplace procedures
	1.6	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Solve multiple path circuit problems	**2.1**	The need to test or measure live is determined in accordance with WHS/OHS requirements and when necessary conducted in accordance with workplace procedures
	2.2	Circuits are checked as isolated in accordance with workplace procedures and regulatory requirements
	2.3	Expected circuit parameters are calculated from relevant component ratings/specifications
	2.4	Circuit parameters are measured in accordance with industry standards and checked against expected values
	2.5	Circuit problems are assessed using measured and calculated values as they apply to multiple path circuits
	2.6	Circuit solutions are determined from measured and calculated values of resistance, voltage, current and power in extra-low voltage (ELV) multiple path circuits
	2.7	Solutions are tested in accordance with workplace procedures and industry standards
	2.8	Problems are resolved without damage to equipment, circuits, the surrounding environment or services using sustainable energy practices
	2.9	Unplanned situations are responded to in accordance with workplace procedures, in a manner that minimises risk to personnel and equipment
3 Complete work and document problem-solving activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed

3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.3 Justification for solutions used to resolve circuit problems is documented

3.4 Work completion is documented, electrical drawings are updated, and relevant personnel are notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installation, fault finding, maintenance or development work functions in multiple path circuits must be demonstrated in one of the following disciplines:

- computers
- data communications
- electrical
- electronics
- fire protection
- instrumentation
- refrigeration and air conditioning
- renewable and sustainable energy systems
- security technology

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEECD0044 Solve problems in multiple path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures, including:
  - identifying and assessing hazards and risks
  - implementing control measures
  - safely measuring the parameters for the whole or any part of a d.c. circuit
- working safety with electric circuits in the electrotechnology sector, including:
  - checking circuits are isolated in accordance with workplace procedures and regulatory requirements
  - applying protections against the physiological effects of electrical currents
- calculating values of voltage, current and resistance in single source series/parallel circuits given any two of these quantities
- calculating power in single source series/parallel circuits from known values of voltage, current and/or resistance
- connecting a parallel circuit: power supply, protection device, switch and loads
- connecting a series/parallel circuit: power supply, protection device, switch and loads
- measuring values of voltage and current in single source ELV series/parallel circuits
- measuring values of resistance, including insulation resistance and continuity/no continuity
- measuring values of capacitance
- testing capacitors to determine serviceability
- altering an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters
- using methodical techniques to solve circuit problems from measured and calculated values
- ensuring compliance with relevant Australian Standards and legislation
- completing work and documenting activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- factors affecting resistance, including:
  - four factors that affect the resistance of a conductor (type of material, length, cross-sectional area and temperature)
  - affect the change in the type of material (resistivity) has on the resistance of a conductor
  - affect the change in 'length' has on the resistance of a conductor
  - affect the change in 'cross-sectional area' has on the resistance of a conductor
  - effects of temperature change on the resistance of various conducting materials
  - effects of resistance on the current-carrying capacity and voltage drop in cables
  - techniques for calculation of the resistance of a conductor from factors such as conductor length, cross-sectional area, resistivity and changes in temperature
  - using digital and analogue ohmmeter to measure the change in resistance of different types of conductive materials (copper, aluminium, nichrome and tungsten) when those materials undergo a change in type of material length, cross-sectional area and temperature
- series/parallel circuits including:
  - schematic diagram of a single source d.c. series/parallel circuit
  - identification of the major components of a series/parallel circuit (power supply, protection device, switch and loads)
  - applications where series/parallel circuits are used in the electrotechnology industry
  - characteristics of a series/parallel circuit (load connection, current paths, voltage drops, power dissipation, and effects of an open circuit in a series/parallel circuit)
  - relationship between voltages, currents and resistances in a bridge network
  - calculation of the total:
    - resistance of a series/parallel circuit
    - current of a series/parallel circuit
    - voltage and the individual voltage drops of a series/parallel circuit
  - techniques for setting up and connecting a single source d.c. series/parallel circuit
  - resistance, voltage and current measurements in a single source d.c. series/parallel circuit
  - the voltage, current, resistances or power dissipated from measured values of any two of these quantities
- parallel circuits including:
  - schematic diagram of a single source d.c. parallel circuit
  - identification of the major components of a parallel circuit (power supply, protection device, switch and loads)
  - applications where parallel circuits are used in the electrotechnology industry
  - characteristics of a parallel circuit (load connection, current paths, voltage drops, power dissipation, and effects of an open circuit in a parallel circuit)
  - relationship between currents entering a junction and currents leaving a junction
  - relationship between branch currents and resistances in a two-branch current divider

network
    - methods to calculate total:
        - resistance of a parallel circuit
        - current of a parallel circuit
        - voltage and the individual voltage drops of a parallel circuit
    - techniques for setting up and connecting a single source d.c. parallel circuit
    - resistance, voltage and current measurements in a single source parallel circuit
    - voltage, current, resistance or power dissipated from measured values of any of these quantities
    - output current and voltage levels of connecting cells in parallel
- meters in a circuit, including:
    - types, operating characteristics and purpose of instruments/meters used to measure voltage, current, resistance and insulation resistance
    - advantages and disadvantages of different instruments/meters commonly used in the field
    - hazards involved in using electrical instruments/meters and relevant safety control measures
    - techniques to correctly connect and accurately read instruments/meters used in the field and common errors that may occur when connecting and reading meters
    - consequences of incorrect connection of instruments/meters into a circuit
    - techniques for calculation of resistance values using voltmeter and ammeter reading
- resistance measurement, including:
    - types, operating characteristics, purpose and storage of instruments to measure resistance (including insulation resistance)
    - functions of various analogue and digital insulation resistance testers
    - reasons why the supply must be isolated prior to using the insulation resistance tester
    - where and why the continuity test and insulation resistance test would be used in an electrical installation
    - the voltage ranges of an insulation resistance tester and where each range may be used
    - AS/NZS 3000 requirements for resistance measurement/testing
    - purpose and method to carry out a calibration check on an resistance tester
    - techniques for measurement of:
        - low values of resistance using a resistance tester continuity functions
        - high values of resistance using a resistance tester insulation resistance function
        - resistance using volt-ammeter methods
- capacitors and capacitance including:
    - techniques for identification of various types of capacitors commonly used in the electrotechnology industry
    - circuit symbol of various types of capacitors: standard, variable, trimmer and polarised
    - terms and units for capacitance and electric charge
    - behaviour of a series d.c. circuit containing resistance and capacitance components. - charge and discharge curves

  - techniques for calculation of quantities from given information: capacitance, charge and voltage
  - techniques for calculation one time constant as well as the time taken to fully charge and discharge a given capacitor
  - techniques for connection of a series d.c. circuit containing capacitance and resistor to determine the time constant of the circuit
- capacitors in series and parallel, including:
  - hazards involved in working with capacitance effects and the safety control measures that should be taken
  - safe handling and the correct methods of discharging various size capacitors
  - dangers of a charged capacitor and the consequences of discharging a capacitor through a person
  - effects of capacitors connected in parallel by calculating their equivalent capacitance
  - effects on the total capacitance of capacitors connected in series by calculating their equivalent capacitance
  - techniques for connecting capacitors in series and/or parallel configurations to achieve various capacitance values
  - common faults in capacitors
  - techniques for testing of capacitors to determine serviceability
  - application of capacitors in the electrotechnology industry.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, manufacturer instructions, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEECD0046 Solve problems in single path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in single path circuits.

It includes working safely; applying problem-solving procedures, including the use of basic voltage, current and resistance measuring devices; and providing known solutions to predictable circuit problems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on single path electrical circuits	**1.1** Scope of work to be undertaken is determined from relevant documentation, electrical drawings or relevant person/s
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied

	1.3	Electrical hazards are identified, risks are assessed, and control measures are implemented
	1.4	Advice is sought from the relevant person/s to ensure the work is coordinated effectively with others
	1.5	Materials required for work are identified and accessed in accordance with workplace procedures
	1.6	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Solve problems in single path electrical circuits	**2.1**	The need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and, when necessary, conducted in accordance with workplace procedures
	2.2	Circuits are checked as isolated in accordance with workplace procedures and regulatory requirements
	2.3	Expected circuit parameters are calculated from relevant component ratings/specifications
	2.4	Circuit parameters are measured in accordance with industry standards and checked against expected values
	2.5	Circuit problems are assessed using measured and calculated values as they apply to single path, single source circuits
	2.6	Circuit solutions are determined from measured and calculated values of resistance, voltage, current, and power in single path circuits
	2.7	Solutions are tested in accordance with workplace procedures and industry standards
	2.8	Problems are resolved without damage to equipment, circuits, the surrounding environment or services using sustainable energy practices
	2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
3 Complete work and document problem solving activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed

3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.3 Justification for solutions used to solve circuit problems is documented

3.4 Work completion is documented, and relevant personnel are notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installation, fault finding, maintenance or development work functions of single source series circuits containing more than one load must be demonstrated in one of the following disciplines:

- computers
- data communications
- electrical
- electronics
- fire protection
- instrumentation
- refrigeration and air conditioning
- renewable and sustainable energy systems
- security technology

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEECD0046 Solve problems in single path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures, including:
  - identifying and assessing hazards and risks
  - implementing control measures
  - safely measuring the parameters for the whole or any part of a d.c. circuit
- working safety with electric circuits in the electrotechnology sector, including:
  - checking circuits are isolated in accordance with workplace procedures and regulatory requirements
  - applying protections against the physiological effects of electrical currents
- determining the operating parameters of an existing circuit
- calculating values of voltage, current and resistance in single source series circuits given any two of these quantities
- calculating power in single source series circuits from known values of voltage and current and/or resistance
- connecting a series circuit: power supply, protection device, switch and load
- measuring values of voltage and current in single source series circuits
- measuring values of resistance
- altering an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters
- identifying loss of supply
- using methodical techniques to solve circuit problems from measure and calculated values
- ensuring compliance with relevant Australian Standards and legislation
- completing work and documenting activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

knowledge of:

- electrical concepts, including:
  - static and current electricity
  - production of electricity by renewable and non-renewable energy sources
  - transportation of electricity from the source to the load via the transmission and distribution systems
  - utilisation of electricity by the various loads
  - basic calculations involving quantity of electricity
- electrical circuits, including:
  - symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram
  - purpose of each component in the circuit
  - effects of an open circuit, a closed circuit and a short circuit
  - multiple and sub-multiple units
- Ohm's Law including:
  - direct current (d.c.) single path circuit
  - voltage and currents levels in a basic d.c. single path circuit
  - effects of an:
    - open circuit
    - a closed circuit and a short circuit on a basic d.c. single path
  - relationship between voltage and current from measured values in a simple circuit
  - determining voltage, current and resistance in a circuit given any two of these quantities
  - graphical relationships of voltage, current and resistance
  - relationship between voltage, current and resistance
- electrical power, including:
  - relationship between force, power, work and energy
  - power dissipated in circuit from voltage, current and resistance values
  - power ratings of devices
  - methods for measuring electrical power in a d.c. circuit
  - effects of power rating of various resistors
- effects of electrical current, including:
  - physiological effects of current
  - principles by which an electric current can produce heat, light, motion and a chemical reaction
  - typical uses of the effects of current
  - mechanisms by which metals corrode
  - fundamental principles listed in AS/NZS 3000 for protection against the damaging effects of current
- electromotive force (EMF) sources and conversion of electrical energy, including:
  - input/output (I/O), efficiency and losses of electrical systems and machines

    - principles of generating an EMF, including:
        - when a mechanical force is applied to a crystal
        - when moving a conductor in a magnetic field
        - by the application of light falling on the surface of photovoltaic (PV) cells
        - from the heating of one junction of a thermocouple
    - principles of producing an electrical current from primary, secondary and fuel cells
- resistors, including:
    - types and applications of fixed and variable resistors used in the electrotechnology industry
    - identification of fixed and variable resistors
    - characteristics of temperature, voltage and light dependent resistors and typical applications of each
    - power ratings of a resistor
    - power loss (heat) occurring in a conductor
    - resistor colour code tables
    - specifying a resistor for a particular application
- series circuits, including:
    - circuit diagram of a single source single path circuit
    - identification of the major components of a series circuit: power supply, protection device, switch and loads
    - applications where series circuits are used in the electrotechnology industry
    - characteristics of a series circuit - connection of loads, current path, voltage drops, power dissipation and effects of an open circuit in a series circuit
    - the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
    - relationship between voltage drops and resistance in a simple voltage divider network
    - techniques for setting up and connecting a single source single path circuit
    - methods for measurement of resistance, voltage and current values in a single source single path circuit
    - effect of an open circuit on a series connected circuit.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, manufacturer instructions, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to use drawings, diagrams, cable schedules, industry standards, codes of practice and specifications as they apply to various electrotechnology work functions.

It includes interpreting schematic, wiring and mechanical diagrams, equipment and cable/connection schedules and manuals; and the use and format of compliance standards, codes and job specifications used in the electrotechnology industry. It also includes the use of site and architectural drawings/plans to show the location of services, apparatus, plant and machinery.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to use drawings, diagrams, schedules and manuals	**1.1** Hazards are identified, risks are assessed and control measures are implemented

	1.2	Need for drawings, diagrams, schedules or manuals is determined from the nature of work to be undertaken
	1.3	Relevant drawings, diagrams, site plans and cable/connection schedules or manuals required for the work to be undertaken are determined and obtained in accordance with workplace procedures
2 Use drawings, diagrams, schedules and manuals to obtain job information	**2.1**	Drawings, diagrams and cable/connection schedules are interpreted using drawing layouts, conventions and symbols
	2.2	Dimensions are extracted from drawings and diagrams in accordance with workplace procedures for application to the work to be undertaken
	2.3	Location of equipment is determined from equipment cable/connection schedules and location diagrams
	2.4	Information relating to work to be undertaken is located and interpreted from relevant cable/connection manuals in accordance with workplace procedures
3 Use drawings, diagrams, schedules and manuals to convey information and ideas	**3.1**	Drawing conventions are applied in neat and legible freehand drawings to convey information and ideas to person/s involved in the work to be undertaken
	3.2	Drawing conventions are used to neatly correct freehand original job drawing to show final 'as-installed' arrangement in accordance with workplace procedures
	3.3	Corrected drawings are forwarded to appropriate person/s in accordance with workplace procedures
4 Comply with industry standards, codes of practice and specifications	**4.1**	Industry standards and codes of practice that specifically apply to relevant disciplines are obtained in accordance with workplace procedures
	4.2	Format of industry standards and codes of practice that apply to relevant disciplines are reviewed and applied in accordance with workplace procedures
	4.3	Purpose, format and content of job specifications are reviewed and applied

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Using drawings, diagrams, schedules, standards, codes and specifications must include:	• assembly, installation, fault finding, maintenance or development work functions in the electrotechnology industry

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - identifying hazards
  - implementing and monitoring control measures
- dealing with unplanned events in accordance with workplace procedures
- extracting dimensions from drawings and diagrams
- reading and interpreting drawings, diagrams and plans to determine the location of electrical/communication/audio accessories and appliances
- using drawings, diagrams, cable/connection schedules, industry standards, codes of practice and specifications used in electrotechnology work, including:
  - giving correct information in freehand drawings
  - identifying and selecting drawings, diagrams, site plans, cable/connection schedules and manuals relevant to the work to be undertaken
  - interpreting drawings, diagrams, cable/connection schedules and manuals correctly
  - obtaining compliance standards and codes applicable to particular disciplines
  - reviewing and understanding the format of compliance standards and codes that apply to particular disciplines
  - reviewing the format and content of typical job specifications
  - using correct conventions in freehand drawings
- sketching and marking up basic circuit diagrams
- developing switching charts to identify the terminals of various types of switches
- using drawings, diagrams, schedules and manuals to:
  - connect equipment
  - convey information and ideas
  - obtain job information.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- architectural drawings, including:
  - site plans, floor plans detailed drawings and standard drawings
  - architectural floor plans to determine the power and lighting or communications/audio/video layouts required in a domestic installation
  - site plans to locate the service point, consumer mains, communication services, main switchboard, distribution boards and/or builders supplies
  - standard drawing scales to determine the actual lengths represented by dimensions on an architectural drawing
  - Australian standard symbols used on floor plans to show the location of the accessories and appliances as detailed in an electrical schedule
- building construction drawings and diagrams, including:
  - building types: timber frame, brick veneer, double brick and metal frame
  - identification of different types of footings, floors, external walls, roofs and interior walls
  - typical cable routes through buildings, structures and premises
  - sequence of each constructional stage for brick, brick veneer and timber cottages
  - identification of the stages at which the electrical/communications - first and second fixing occurs in the constructional sequence
  - areas of cooperation between electrical/communications and other building trades
- circuit diagrams, including:
  - purpose of circuit diagrams in the electrotechnology industry
  - conventions used in and the features of circuit diagrams
  - common symbols used in circuit diagram
- electrical drawings, including:
  - types of electrical drawings: block, circuit, wiring and ladder diagrams
  - purpose and application of block, circuit, wiring diagrams and ladder diagrams
  - Australian standard symbols used to represent components on electrical diagrams
  - converting a circuit diagram to a wiring diagram
  - identification of cable type, origin and route from a cable schedule
  - developing a cable schedule for a given installation
- purpose, format and content of typical job specifications, including common templates on which job specifications are written
- regulations for undertaking electrical work, including legislative requirements for ensuring electrical or electronic equipment is safe i.e. compliance requirements of electrical installations
- scope of work covered by licensing in the electrotechnology industry (electrical licensing)
  - legislative requirements for ensuring electrical or electronic equipment is safe, including compliance requirements of electrical installations

- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures include risk mitigation process
- standards philosophy and format, including:
  - performance verses prescriptive requirements
  - purpose of technical standards and their development
  - role of Standards Australia/New Zealand, International Organisation for Standardisation (ISO) and the International Electrotechnical Commission (IEC)
  - how standards are used in compulsory and accreditation compliance schemes
  - arrangement and use of technical standards in relation to electrical and electronic work
  - how to read and apply a standard
  - standards and codes that apply to all types of electrical installations
  - standards mandated under regulation (e.g. Wiring Rules) or by an authority, deemed-to-comply standard and local service requirements (e.g. service rules)
  - codes applicable to electrical safe working practices and some aspects of the Building Code of Australia (BCA)
- wiring diagrams, including:
  - purpose of wiring diagrams in the electrotechnology industry
  - conventions used in and the features of wiring diagrams
  - common symbols used in wiring diagrams.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEECO0001 Estimate electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to estimate material and labour costs for competitive quotation/tenders for electrotechnology work exceeding $AUD20,000.

It includes reading and understanding job specifications, adjusting for material take-offs, determining labour and site requirements, costing and documenting.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine project scope	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures are implemented

	1.3	Extent of the project is determined from design brief specifications, other relevant documentation and discussions with appropriate person/s
	1.4	Estimated completion date is determined from design brief specifications, other relevant documentation and discussions with appropriate person/s
	1.5	Project activities are planned to meet scheduled timeframes in consultation with relevant person/s
2 Estimate electrotechnology project	**2.1**	Material take-offs are determined accurately and checked against job specifications
	2.2	Materials, labour and other costs are determined from relevant workplace documentation
	2.3	Sources and availability of materials and human resources required for the electrotechnology project are determined in accordance with workplace procedures
	2.4	Estimates are checked and revised for accuracy in costing against job specifications in consultation with relevant person/s
	2.5	Unplanned events are responded to in accordance with workplace procedures
3 Document and submit quotation	**3.1**	Project estimates are documented in accordance with workplace procedures
	3.2	Quotation is forwarded to relevant person/s within specified timeframe
	3.3	Quotation documentation is filed in accordance with workplace policies and procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC005B Estimate electrotechnology projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEECO0001 Estimate electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- adjusting estimates
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- checking and documenting estimates
- creating, documenting, forwarding and filing quotations
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting and submitting quotations
- estimating completion dates
- estimating electrotechnology project material and labour costs
- estimating electrotechnology projects for a competitive quotation/tender for which the value must exceed $AUD20,000
- identifying risk control measures
- planning extent of projects
- sourcing materials and human resources
- working within timeframes.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- contingency
- costing
- design brief and specifications
- documents used in estimating and costing margins
- material take-off methods, including a list of materials with quantities and types of material
- money labour rates method of costing
- life cycle costing analysis

- project estimates, including quotations and adjustments
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- resources to be quantified and costed
- resource (labour, plant, equipment and materials).

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEECO0014 Prepare tender submissions for electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to prepare tender documents for electrotechnology projects.

It includes identifying tender requirements, verifying estimates and capacity to meet timelines. It also includes complying with legal requirements and documenting submissions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECO0001 Estimate electrotechnology projects

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Ascertain tender requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed

	1.3	Work required under tender is determined from relevant documents
	1.4	Special conditions and requirements for lodging the tender are ascertained from relevant documents
	1.5	Appropriately competent person/s is engaged to estimate material labour and relevant costs
	1.6	Activities are planned to meet specified tender submission timeline
2 Assemble tender submission	**2.1**	All inputs to the tender are obtained and verified with relevant person/s responsible for their development
	2.2	Materials and human resources needed to complete the work under the conditions of the tender are confirmed with relevant person/s responsible
	2.3	Legal advice is sought on contingent aspects of the tender
	2.4	Contingency allowances are included in tender in accordance with workplace procedures
3 Document tender submission	**3.1**	Tender submission is documented in accordance with workplace procedures and relevant lodgement requirements
	3.2	Tender submission is verified for accuracy with relevant documents and prepared for lodgement in accordance with tender timeline

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC006B Prepare tender submissions for electrotechnology projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEECO0014 Prepare tender submissions for electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- ascertaining the tender requirements, including:
  - planning tender submission activities
  - special conditions and requirements
- assembling tender submission, including:
  - ensuring tender submission is ready for lodgement before the closing date/time
- documenting tender submission.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant documents supplied with a tender
- relevant job safety assessments or risk mitigation processes
- relevant special conditions included in a tender
- relevant tender submission requirements
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to preparing tender submission for electrotechnology projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEEEL0020 Solve problems in low voltage a.c. circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to ascertain correct operation of single and three phase alternating current (a.c.) circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions.

It includes safe working practices, multi-phase circuit arrangements, issues related to fault protection, power factor and multiple earthed neutral (MEN) systems and solutions to circuit problems derived from calculated and measured parameters.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) a.c. or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEL0021 Solve problems in magnetic and electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify low voltage (LV) a.c. circuit problem	**1.1** WHS/OHS requirements and workplace procedures for work area are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures and workplace procedures are implemented
	1.3 Safety hazards which have not previously been identified are noted on job safety assessments and existing risk control measures are implemented
	1.4 Circuit problems are identified from documentation or work supervisor to determine the scope of work
	1.5 Advice is sought from the work supervisor to ensure work is coordinated effectively with others
	1.6 Sources of materials required for work are identified in accordance with workplace procedures
	1.7 Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety
2 Solve LV a.c. circuit problems	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to test or measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace safety procedures
	2.3 Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Methodical techniques are used to resolve circuit problems from measured and calculated values as they apply to single and three phase LV circuits in

		accordance with workplace procedures
	2.5	Existing circuits are altered to comply with power factor correction in compliance with industry standards
	2.6	Power factor of a circuit is calculated from given measurements
	2.7	Low power factor is improved by altering the reactive power of a circuit
	2.8	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.9	Problems are resolved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and document activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to resolve circuit problems is documented in accordance with workplace procedures
	3.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in a.c. circuits must include:

- determining the operating parameters of existing circuits
- altering an existing circuit to comply with specified operating

	parameters • developing circuits to comply with a specified function and operating parameters of voltage, current, impedance, power and power factor • determining the cause of low power factor in an existing circuit • determining conditions causing an existing circuit to be unsafe, including electric shock hazard from indirect contract with conductive parts
Solving problems in single phase circuits must include:	• connecting single phase circuits • choosing correct instruments • taking measurements correctly and accurately
Solving problems in three phase circuits must include:	• connecting three phase circuits • choosing correct instruments • taking measurements correctly and accurately
Solving problems in LV a.c. circuits must include at least four of the following applications:	• series a.c. circuits • parallel a.c. circuits • series/parallel a.c. circuits • single phase motors/controls • three phase motors/controls • synchronous machines • transformers/auxiliary components • star connected circuits • delta connected circuits • star-delta interconnected circuits • open delta circuits

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG102A Solve problems in low voltage a.c. circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEEEL0020 Solve problems in low voltage a.c. circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements Including:
  - implementing OHS/WHS workplace procedures and practices, including risk control measures
  - safely measuring the parameters for the whole or any part of a circuit
- measuring:
  - instantaneous, peak, peak-to-peak values and the period of a sinusoidal waveform
  - the phase angle between two or more alternating quantities from a given sinusoidal waveform diagram
  - the fault-loop impedance of typical circuits
  - the branch currents and voltages in a series and parallel resistance inductance capacitance (RLC) circuit and use a phasor diagram to determine the total current and phase angle between circuit voltage and circuit current
- determining:
  - phase relationship between two or more sinusoidal waveforms from a given diagram
  - the impedance, current and voltages and phase angles for a series and parallel resistance capacitance (RC), resistance inductance (RL), and RLC circuit given the resistance, capacitance, inductance and supply voltage
  - comparison of current limiting characteristics of inductors and resistors
  - the relationship between inductive reactance and capacitive reactance and frequency
  - difference between true power, apparent power and reactive power and the units in which these quantities are measured
  - the root-mean-square (rms) value of line and phase, voltage and current given any one of these quantities
  - the effects of a high impedance in the neutral conductor of a three phase four wire system supplying an unbalanced load where multiple earthed neutral (MEN) earthing is employed
  - the value of neutral current in an unbalanced three phase four wire systems given line

currents and power factors
    - how the power factor of a three phase installation can be improved
    - fault loop impedance using resistance and reactance values from relevant industry standards
    - voltage, current and resistance from measured or given values of any two of these qualities
    - the phase sequence of a three phase supply
- drawing and labelling the following:
    - the power triangle to show the relationships between true power, apparent power and reactive power
    - the typical combinations of three phase interconnected systems using star and delta connection
    - the impedance triangle for a series RC, RL and RLC circuit
    - the equivalent circuit of a practical inductor
    - phasor diagrams to show:
        - the relationship between two or more alternating current (a.c.) values of voltage and/or current, including 'in-phase', 'out-of-phase', 'phase angle', lead' and 'lag'
        - a series and parallel RC, RL, and RLC circuits
- calculating:
    - rms value of voltage generated in each phase given the maximum value
    - terms in relation to a sinusoidal waveform from values of root-mean-square (rms) value, frequency, peak voltage, period and instantaneous value
    - capacitive reactance and inductive reactance for a given capacitor and inductor
    - total impedance for a series and parallel RLC circuit
- connecting a three-phase star and delta load
- setting up and connecting a single-source resistive a.c. circuit and taking voltage and current measurements to determine the resistance
- applying sustainable energy principles and practices
- completing workplace documentation
- voltage, current and reactance of inductive and capacitive reactance by applying Ohm's law in purely inductive and capacitive a.c. circuits given any two quantities
- altering an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters
- determining conditions causing an existing circuit to be unsafe
- dealing with unplanned events.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- a.c. quantities, including:

- Pythagoras theorem to a right-angle triangle
- sine, cosine and tangent ratios of a right-angle triangle
- sinusoidal voltage generated by a single turn coil rotated in a uniform magnetic field and resulting current
- terms in relation to a sinusoidal waveform involving:
  - period
  - maximum value
  - peak-to-peak value
  - instantaneous value
  - average value
  - rms value
- use of a cathode-ray oscilloscope (CRO) to measure d.c. and a.c. voltage levels

- phasor diagrams, including:
  - convention for representing voltage, current and the reference quantity in a phasor diagram
  - purpose of phasor diagrams
- single element a.c. circuits, including:
  - applications of capacitive, inductive and resistive a.c circuits
  - defining inductive and capacitive reactance
  - relationship between voltage drops and current in resistive a.c. circuit
  - arrangement, characteristics of single item inductive and capacitive circuits
- RC and RL series a.c. circuits, including:
  - capacitive and inductive components in power circuits and systems and the effect on the phase relationship between voltage and current
  - impedance and impedance triangle
  - voltage triangle
  - arrangement, characteristics, and relationship between resistance, capacitance and inductance in RL, RC, and LC series circuits
- RLC series and parallel a.c. circuits, including:
  - practical examples of RLC series and parallel circuits
  - voltage and current triangle
  - relationship between resistance, capacitance and inductance in RLC parallel circuits
- power in an a.c. circuit, including:
  - definition of power factor and phase angle
  - methods used to measure single phase power, energy and demand
  - effects of low power factor
- power factor improvement, including:
  - requirements for power factor improvement
  - methods used to improve low power factor of an installation
  - local supply authority and AS/NZS 3000 requirements regarding the power factor of an

installation and power factor improvement equipment
  - local supply authority and AS/NZS 3000 requirements for installation of capacitors including safety considerations
  - using manufacturer catalogues to select power factor equipment for a particular installation
- harmonics and resonance effect in a.c. systems, including:
  - conditions in a series and parallel a.c. circuit that produce resonance
  - dangers of series and parallel resonance circuits
  - methods and test equipment used to test for harmonics
  - methods used to reduce harmonics in a.c. power system
  - problems that may arise in a.c. circuits as a result of harmonics and how these are overcome
  - sources in a.c. systems that produce harmonics
  - term harmonic in relation to the sinusoidal waveform of an a.c. power system
- three phase systems, including:
  - features of a multi-phase system
  - comparison of voltages generated by single and multi-phase alternators
  - how three phase is generated in a single alternator
  - advantages of three phase for power systems
  - relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each
  - method of determining the phase sequence or phase rotation of a three-phase supply
- three phase star connections, including:
  - arrangement and characteristics of a three phase star connection
  - effect of a reversed phase winding of a star connected alternator
  - examples of balanced and unbalanced loads in typical power systems
  - terms balanced load and unbalanced load
- three phase four wire systems, including:
  - purpose of the neutral conductor in three phase four wire systems
  - AS/NZS 3000 requirements regarding neutral conductors
  - AS/NZS 3008.1.1 Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation conditions method for determining voltage drop in unbalanced three phase circuits
- three phase delta connections and interconnected systems, including:
  - arrangement and characteristics of a three phase delta connection
  - effect of a reversed phase winding of a delta connected transformer
  - examples of loads in typical power systems
  - limitations and uses of open delta connections
- energy and power requirements of ac systems, including:
  - purposes for measuring power, energy, power factor and maximum demand of a.c. power systems and loads

  - difference between true power, apparent power and reactive power and the units in which these quantities are measured in a three phase system
  - methods used to measure three phase power, energy, power factor and demand
  - using manufacturers catalogues to select measurement equipment for a particular installation
- fault-loop impedance, including:
  - procedures for testing fault-loop impedance
  - term fault-loop impedance of an a.c. power system
- local requirements and relevant industry standards relating to:
  - the installation of capacitors
  - the power factor of an installation and power factor improvement equipment
  - harmonics and resonance effect in a.c. power systems
  - neutral conductors
- phase relationship between line and phase voltages and line and phase currents of star, delta, and typical interconnected systems using star connections and delta connections
- relevant manufacturers' specifications

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEEEL0021 Solve problems in magnetic and electromagnetic devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to determine correct operation of electromagnetic devices and related circuits and provide solutions as they apply to electrical installations and equipment.

It includes working safely; applying power circuit problem-solving processes, including the use of testing and measuring devices; and providing solutions derived from measurements and calculations to predictable problems in electromagnetic devices and related circuits.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work with electromagnetic devices and circuits	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 Device/s and/or circuit/s problems are identified from documentation or work supervisor to determine scope of work
	1.3 Hazards are identified, risks are assessed and control measures are implemented
	1.4 Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety
	1.5 Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements
	1.6 Advice is sought from the work supervisor to ensure work is coordinated effectively with others
2 Solve electromagnetic device and/or circuit problems	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures workplace procedures
	2.3 Relevant circuits and devices are checked as being isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Operating parameters of an existing circuit with an electromagnetic device are determined

	2.5	Methodical techniques are used to resolve circuit problems from measured and calculated values as they apply to electromagnetic devices/circuits
	2.6	Existing circuit with an electromagnetic device is altered to comply with specified operating parameters
	2.7	Circuit with electromagnetic device is developed to comply with a specified function and operating parameters
	2.8	Electrical equipment is connected and tested to determine correct operation
	2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.10	Problems are resolved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and documentation	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to resolve problems is documented in accordance with established workplace procedures
	3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

Companion Volume Implementation Guide.

Electromagnetic devices must include at least three of the following devices:

- reed switches
- solenoids
- relays
- contactors
- inductive limit switches
- lifting magnets
- core balance devices
- magnetic overloads
- magnetic brakes
- magnetic circuit breakers

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEEEL0021 Solve problems in magnetic and electromagnetic devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - identifying hazards and assessing risks and applying control measures
  - confirming isolation of circuits
- using methodological techniques to solve problems in circuits with an electromagnetic device from measured and calculated values
- determining the operating parameters of an existing circuit with an electromagnetic device, including:
  - the direction of magnetic field around a current-carrying conductor and a coil
  - a current-carrying conductor under the influence of a magnetic field
- modifying an existing circuit with an electromagnetic device to comply with specified operating parameters
- connecting electromagnetic devices to comply with a specified function and operating parameters
- completing work and documenting activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- magnetism, including:
  - common magnetic and non-magnetic materials
  - magnetic field patterns of magnets
  - magnets attraction and repulsion when brought in contact with each other
  - practical applications of magnets
  - principle of magnetic screening (shielding) and its applications

- electromagnetism, including:
  - conventions representing direction of current flow in a conductor
  - direction of force between adjacent current-carrying conductors
  - effect of current, length and distance apart on the force between conductors
  - magnetic field around an electromagnet, a single conductor and two adjacent conductors carrying current
  - magnetomotive force (mmf) and its relationship to the number of turns in a coil and the current flowing in the coil
  - practical applications of electromagnets
- magnetic circuit types and associated terminology
- methods used to reduce electrical losses in a magnetic circuit
- electromagnetic induction, including:
  - principle of electromagnetic induction
  - applications of electromagnetic induction
  - Lenz's law
- inductance, including:
  - applications of the different types of inductors
  - industry standard symbols for inductors
  - types of inductor cores
  - construction of an inductor
  - definition of terms: self-induction, inductance and mutual inductance, and time constants
  - effect of physical parameters on the inductance of an inductor
  - relationship between load voltage, current and self-induced electromagnetic force in a direct current (d.c.) circuit having inductance
  - practical applications for the effects of self and mutual induction
  - undesirable effects of self and mutual induction
- magnetic principles in measurement instruments
- magnetic devices, including:
  - operation and application of:
    - magnetic sensing devices
    - contactors and relays
    - solenoids
  - magnetic methods used to extinguish the arc between opening contacts
- relevant manufacturer specifications

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities

Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEENEED104A Use engineering applications software on personal computers

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the use of computer application relevant to engineering support work functions. It encompasses applying user preferences, using application menus and tools, entering and retrieve information, working with groups and transferring and printing files.

Note:

Examples of engineering application software are Visio, Electronic Work Bench, Lab View, Network Simulator.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a

Performance Criteria describe the required performance needed to demonstrate achievement of the element.

competency standard unit	Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to use computer applications.	1.1	OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
	1.2	Established OHS risk control measures and procedures in relation to computer and keyboard use are followed.
	1.3	Application software and information required for use is obtained from appropriate sources.
	1.4	On-screen instructions in relation to any anomaly such as a virus warning are followed.
	1.5	Help menu is used to resolve any straightforward start up or access issues or anomalies.
2 Use engineering application software.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Techniques that apply to a particular software package are used to produce appropriate files.
	2.3	Routine checks are made to ensure accuracy of information in accordance with quality requirements.
3 Output information from an application.	3.1	Completed files are stored appropriately in accordance with enterprise requirements.
	3.2	Files are printed for formal records and/or forwarded to others.
4 Shut down computer.	4.1	Files are named, arranged, saved and backed up in accordance with enterprise requirements.
	4.2	Computer shutdown procedures are followed and computer switched off.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices using engineering application software.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ED104A Personal computers, engineering applications software basic

Evidence shall show an understanding of object orientated programming basics to an extent indicated by the following aspects:

T1 Computer Systems Overview encompassing:

- Safety
- Applications of computers in industry
- Types of computer systems
- Hardware components
- Software and firmware
- Memory
- Peripherals
- Removable storage devices
- PC hardware inventory
- Networking

T2 Operating System Overview encompassing:

- Software layer model
- Function and characteristics of an operating system
- File structure
- Formatting disks
- Boot process
- Configuration files

T3 Windows Operating System encompassing

- Windows screen
- Windows Explorer
- File management
- Managing software, updates, backups and virus protection.

T4 Word Processors encompassing

REQUIRED SKILLS AND KNOWLEDGE

- Word files
- Formatting
- Engineering symbols
- Tables and lists
- Drawings
- Spelling, grammar, and 'search-and-replace'
- Printing

T5 Spreadsheets encompassing

- Parts of a spreadsheet
- Excel file management
- Inserting data into spreadsheets
- Formatting spreadsheets
- Charts
- Engineering problem solving
- Printing

T6 Databases encompassing:

- Features and purpose of database
- Searching existing database
- Creating a simple database
- Manipulating data in a database
- Advance sort functions
- Reports

T7 Transferring Data Between Windows Applications encompassing:

- Moving data between Word, Excel and Access

T8 Drawing and Computer Assisted Design (CAD) programs encompassing:

- Computer drawing using applications such as Visio.
- Incorporation of electrical/electronic symbols into computer drawings.

T9 E-mail and Internet Browsers encompassing:

- Browsers
- Search Engines
- Web-based e-mail (e.g. Hotmail)
- Application-based e-mail (e.g. Outlook).

Evidence Guide

EVIDENCE GUIDE

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Use engineering applications software as described in 8) and including:

A Following application instructions to input and output information.

B Storing information appropriately.

C Outputting information to a printer.

D Transferring information between systems.

E Saving, storing and backing up files for effective retrieval by others.

F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to using engineering application software.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to using at least two of the following types of engineering applications at a basic level.

- Office Applications
- Computer Aided Design
- Engineering data analysis software
- Engineering modelling
- Project management
- Network simulator
- Protocol analyser

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Computer Systems

UEENEED117A Install and configure network systems for internetworking

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This competency standard unit covers the interconnection of networks. It encompasses safe working practice, basic installation and configuration of routers and documenting installation and configuration activities.

Note:
This unit applies to all aspects of Electrotechnology - engineering applications only. For general competencies related Information Technologies refer to the latest endorsed IT Training Package.

Application of the Unit

Application of the Unit **2)**

This competency standard unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships

License to practice **3)**

and the like.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to install and configure internetworking systems.	1.1	OHS processes and procedures for a given work area are obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	The extent of internetworking to be installed and configured is determined from internetworking performance specifications and in consultations with relevant persons.
	1.4	Media and software required for internetworking is selected in accordance with organisation's established procedures.
	1.5	Network cabling test reports are obtained and reviewed to determine whether it complies with the required regulatory and performance standard.
	1.6	Activities are planned to meet scheduled timelines in consultation with others involved on the work.
	1.7	Appropriate development tools and software are selected based on specified requirements and performance standard.
	1.8	Strategies are implemented to ensure network development is carried out efficiently.
2 Install and configure internetworking	2.1	OHS risk control measures and procedures for

ELEMENT	PERFORMANCE CRITERIA	
systems.		carrying out the work are followed.
	2.2	Knowledge of internetworking arrangements, subnetting and routing protocols are applied to installing and configuring routers and TCP/IP addresses.
	2.3	Routing protocols are selected and configured as per requirements specified for the internetworking systems.
	2.4	Common routing, TCP/IP and access malfunctions are identified and rectified using known solutions drawing knowledge of basic internetworking arrangements and protocol.
	2.5	Approaches to issues/problems are analysed to provide most effective solutions.
	2.6	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.
3 Report install and configuring of internetworking systems.	3.1	Written justification is made for internetworking installation and configuring activities and appropriate person/s notified in accordance with established procedures.
	3.2	Network services records are maintained in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and configuring networking systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ED117A Internet Networks

Evidence shall show an understanding of network basics to an extent indicated by the

REQUIRED SKILLS AND KNOWLEDGE

following aspects:

T1 Calculate subnet addresses and masks

T2 Layer 3 and 4 Protocols

T3 Static and dynamic routing

T4 Basic Router Configuration

T5 Router Security

T6 Router Boot Sequence

T7 Router operating system management

T8 Password Recovery

T9 Router components and interfaces

T10 Troubleshooting at all layers

T11 Interior and Exterior routing protocols

T12 Distance vector routing protocols

T13 Link state routing protocols

T14 Routing tables

T15 Metrics used by routing protocols to find routes

T16 Advantages and disadvantages of distance vector and link state routing protocols

T17 Route summarisation

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with

the "Assessment Guidelines – UEE11". Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
  - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements; and
  - Demonstrate an appropriate level of skills enabling employment; and
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install and configure networking systems as described in 8) and including:

A Establishing the extent of internetworking installation.

B Selecting appropriate internetworking media and software.

C Determining whether network cabling is compliant.

D Installing and configuring basic routing and TCP/IP protocols.

E Calculate variable length subnet mask as per requirements specified for the internetworking systems.

F Identifying common routing, TCP/IP and access malfunctions.

G Applying known solutions to common routing,

	TCP/IP and access malfunctions.
H	Documenting internetworking installation and configuration activities.
I	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above in context of and specific resources for assessment, evidence should show demonstrated competency in installing and configuring networking systems.

Method of assessment

9.4)

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit

applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to installing and configuring internetworking systems between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or a LAN and the Internet.

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Computer Systems

UEENEEE083A Establish and follow a competency development plan in an electrotechnology engineering discipline

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers establishing and following a plan for one's own competency development. It encompasses establishing a plan in consultation with the enrolling registered training organisation (RTO), following industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, pursuing opportunities to develop competencies, to self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

Application of the Unit

Application of the Unit **4)**

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 6

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to

1.2) License to practice

occupational health and safety and where applicable a contracts of training.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Establish a	1.1 A competency development plan incorporating course

ELEMENT	PERFORMANCE CRITERIA	
competency development plan		work, assessment scheme and workplace activities is established in consultation with the enrolling RTO.
	1.2	Obligations and expectations of the competency development plan are obtained and understood.
2 Comply with engineering industry/enterprise workplace policies and procedures	2.1	Industry/enterprise workplace policies and procedures for all work activities are obtained and understood.
	2.2	Work instructions are followed, any clarification involved being sought from the immediate supervisor/appropriate person.
	2.3	Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.
3 Monitor and respond to a personal competency development plan.	3.1	All aspects of the competency development plan are confirmed in consultation with appropriate persons.
	3.2	All components of the competency development plan are followed diligently.
	3.3	Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
	3.4	Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
	3.5	Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.
	3.6	Modifications to the personal competency development plan are made in consultation with appropriate persons.
	3.7	Obligations are met for the regular and accurate reporting of competency development activities as per industry/enterprise policies and procedures.
	3.8	Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE083A Engineering competency development

Evidence shall show an understanding of engineering competency development to an extent indicated by the following aspects:

T1 Components of a competency development plan encompassing:

- Competencies to be achieved
- Course work and timetable
- Assessment scheme
- Aspects of competency to be developed in the workplace
- Methods of monitoring and recording relevant workplace activities.

T2 Obligations and expectations under a competency development plan

T3 Scope for industry/enterprise policies and procedures

- Policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development.
- Monitoring and reporting work activities.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1**)

Longitudinal competency development approaches to assessment,

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such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

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- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Participate in electrical work and competency development activities as described in 8) including:

  A Establishing a competency development plan in consultation with the enrolling Registered Training Organisation (RTO).

  B Understanding obligations and expectations of the competency development plan.

  C Understand industry/enterprise workplace policies and procedures

  D Following work instructions and seeking clarification of how particular work is to be carried out and the procedures involved.

  E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person

  F Reporting periodically the competency development activities in accordance with requirements

  G Periodically reviewing progress of the competency development activities in accordance with requirements

  H Pursuing strategies to develop opportunities for gaining

EVIDENCE GUIDE

the range of workplace experiences and exposure

I Progressing successfully against periodic or staged evaluative performance events

G Seeking assistance to overcome difficulties in developing competency

K Dealing with unplanned events.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to participating in development and following a personal competency development plan.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and

9.5)

This unit shall be assessed concurrently with other units in a

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relationship with other units qualification.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to other units in an advance diploma qualification to contribute the evidence used in evaluating when competency has been sufficiently demonstrated. The unit applies to both the educational program provided by a registered training organisation and real work under a formal training agreement.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

Custom Content Section

Competency Field **5)**

Commercial

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit specifies the mandatory requirements of occupational health and safety and how they apply to the various electrotechnology work functions. It encompasses responsibilities for health and safety, risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

This unit addresses information, processes and techniques for the application of general occupational health and safety requirements in workplaces and is essential for employees without managerial or supervisory responsibilities

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to enter a	1.1 Work area access permits are obtained from appropriate personnel according to established

ELEMENT	PERFORMANCE CRITERIA	
work area		procedures
	1.2	Safe work methods for controlling risk obtained, read and understood prior to undertaking a work activity.
	1.3.	Preparations for electrical and non-electrical isolation are carried out to prevent creation of hazards from loss of machine/system/process control according to established procedures.
	1.4	Tools and equipment needed for the work are checked for safety and correct functionality according to established procedures and regulatory requirements.
2 Apply safe working practices.	2.1	Safe work methods for controlling risk are followed accurately.
	2.2	Workplace procedures for dealing with accidents, fires and emergencies are followed according to work procedures and scope of responsibility and competencies.
3. Follow workplace procedures for hazard identification and risk control	3.1	Hazards are identified and control measures implemented and monitored through active participation in the consultation process with employer and other employees.
	3.2	Hazards in the work area are recognised and reported to appropriate personnel according to established procedures.
	3.3	OHS records of incidents are completed in accordance with regulatory requirements and established procedures.
	3.4	Workplace instructions and training are followed accurately within established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying OHS practices in the workplace.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE101A Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

T1 The basic legal requirements covering occupational health and safety in the workplace encompassing:

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- employer and employee responsibilities, rights and obligations.
- major functions of safety committees and representatives.
- powers given to Occupational Health and Safety Inspectors
- housekeeping and potential hazards in relation to improper housekeeping
- selecting appropriate personal protective equipment (PPE) given hazardous situations

T2 The work environment encompassing:

- typical hazards associated with a range of work environments
- procedures used to control the risks associated with these hazards
- principles of risk assessment / management and state the purpose of each.
- hierarchy of OH&S hazard control measures.
- required documentation for risk assessment.
- commonly used workplace safety signs.
- workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation.
- appropriate fire extinguisher for a given type of fire.
- requirements for the location, mounting and maintenance of portable fire extinguishers.
- basic process of fighting a fire.
- Importance of safe premises, buildings and security in an industrial setting and the consequences of non- compliance.
- standard work procedure.

T3 Manual Handling encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- typical manual handling injuries and the effect they can have on lifestyle
- situations that may cause manual handling injuries
- correct procedures for lifting and carrying to prevent manual handling injuries

T4 Chemicals in the workplace encompassing:

- hazardous substances and dangerous goods.
- classification of chemicals as hazardous substances and/or dangerous goods
- requirements for labelling of chemicals in the workplace
- safe storage procedures for chemicals
- purpose and interpretation of material safety data sheet (MSDS)

T5 Working at heights encompassing:

- dangers associated with working on ladders and scaffolds
- identification of work area as a height risk and use appropriate safety equipment to prevent a fall
- selecting an appropriate ladder for a given situation and perform a safety check before use
- precautions that should be taken when ascending and working off a ladder
- precautions that should be taken when working on and around a scaffold and elevated platforms.

T6 Confined spaces encompassing:

- hazards associated with working in a confined space
- identifying workplace situations that could be classified as a confined space
- control measures for working in a designated confined space

T7 Physical and psychological hazards encompassing:

- short and long term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
- effects of vibration on the human body and work practices to protect against vibration
- effects of thermal stress on the human body and work practices to protect against thermal stress
- effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation.
- dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger.
- occupational overuse syndrome, how it occurs and means to overcome it
- factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
- detrimental effects and dangers of drug and alcohol use in the workplace

T8 Working safely with electricity encompassing:

- effects of electric shock on the human body

REQUIRED SKILLS AND KNOWLEDGE

- common causes of electrical accidents
- precautions that can minimise the chance of electric shock (earthing, extra low voltage, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

T9 Life support - CPR in the workplace encompassing:

- First Aid.
- responsibilities of the First Aider.
- priorities of first aid management for any accident or injury.
- procedures required at an accident scene.
- legal and ethical issues, which may impact on the management of care.
- 'Duty of Care'.
- examination of a casualty for injuries.
- effect of cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (CPR).
- signs and symptoms of an altered level of consciousness
- management of simulation of a casualty with an altered level of consciousness.
- signs and symptoms of shock.
- management of simulation of a casualty in shock

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over

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time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able

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to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement encompassing:
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Applying OHS practices in the workplace as described in 8) and including:

A Preparing to enter the workplace including, the use of work permits and clearances and isolation permissions.

B Understanding and following risk control safe work methods.

C Applying work procedures and instructions as they apply to risk control measures.

D Dealing with accidents and emergencies within the scope of responsibility.

E Participation in consultation processes, identifying hazards and implementing and monitoring control measures.

F Dealing with unplanned events

Note:
Ability to implement these Occupation Health and Safety

EVIDENCE GUIDE

measures shall be demonstrated on all occasions safety issues arise.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to applying OHS practices in the workplace.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

This unit shall be assessed concurrently, as it relates to other units undertaken in a possible skill clusters or qualification.

Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to each of the following

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to hazards present in the industry and particular workplace
- Accepted industry work procedures and the specific safety procedures and work instructions for particular workplace.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

Custom Content Section

Competency Field 5)

Competency Field **5)**

Electrotechnology

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers basic fitting and fabrication techniques as they apply in the various utilities industry work functions. It encompasses the safe use of hand, fixed and portable power tools; cutting, shaping joining and fixing using metallic and non-metallic materials; dismantling and assembling equipment; basic mechanical measurement and marking-out and reading drawings/diagrams.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to persons entering work in utilities industry and may be used in school-based vocational programs.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential

outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare for dismantling, assembling and fabrication work.	1.1	OHS procedures for a given work area are obtained and understood through established routines and procedures.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazard not previously identified are reported and advice on risk control measures is sought from the work supervisor.
	1.4	The nature of the work is obtained from documentation and from work supervisor to establish the scope of work to be undertaken.
	1.5	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.6	Materials required for the work are obtained in accordance with established routines and procedures.
	1.7	Tools, equipment and measuring devices needed to carry out the work are obtained and checked for correct operation and safety.
	1.8	Cutting tools such as drills and chisels are sharpened to suit the material on which they are to be used.
2 Dismantle and assemble utilities industry apparatus.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.3	Appropriate tools are selected and used correctly and safely in dismantling and assembling apparatus.
	2.4	Manufacturer apparatus dismantling and assembling guides are used where applicable.

ELEMENT	PERFORMANCE CRITERIA	
	2.5	Components are marked or tagged during the dismantling to help ensure correct and efficient reassembly.
	2.6	Dismantled components and parts are stored to protect them against loss or damage.
	2.7	Apparatus is dismantled and assembled efficiently without waste of materials and energy and/or damage to apparatus and the surrounding environment or services.
	2.8	Procedures for referring non-routine events to immediate supervisor for directions are followed.
	2.9	Routine quality checks are carried out in accordance with work instructions.
	2.10	OHS risk control work completion measures and procedures are followed.
	2.11	Work site is cleaned and made safe in accordance with established procedures.
	2.12	Work supervisor is notified of the completion of the work in accordance with established procedures.
3 Fabricate utilities industry components.	3.1	Established OHS risk control measures and procedures for carrying out the work are followed.
	3.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	3.3	Appropriate tools are selected and used correctly and safely in fabricating components.
	3.4	Drawings and instruction for the fabrication of components are followed.
	3.5	Component dimensions are determined directly or by calculation from information given in job drawings and instructions.
	3.6	Components are fabricated efficiently without waste of materials and energy and/or damage to the surrounding environment or services.

ELEMENT	PERFORMANCE CRITERIA
	3.7 Procedures for referring non-routine events to immediate supervisor for directions are followed.
	3.8 Routine quality checks are carried out in accordance with work instructions.
	3.9 OHS risk control work completion measures and procedures are followed.
	3.10 Work site is cleaned and made safe in accordance with established procedures.
	3.11 Work supervisor is notified of the completion of the work in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and fabricating, dismantling, assembling of utilities industry components.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE102A Hand and power tools and their application

Evidence shall show an understanding of hand and power tools and their application to an extent indicated by the following aspects:

T1 Mechanical drawing interpretation and sketching encompassing:

- drawing standards and conventions used in drawings of mechanical components as specified in AS1100
- basic abbreviations and symbols used in drawing of mechanical components
- interpretation of mechanical drawings commonly used in the electrotechnology industry (orthogonal projection, third angle - detail and assembly drawings, pictorial views)
- laying out a drawing of mechanical components using engineering drawing convention.
- freehand drawings of mechanical components showing all information needed for its manufacture/fabrication

REQUIRED SKILLS AND KNOWLEDGE

T2 Workshop planning and materials encompassing:

- methods used to work safely in an industrial work environment.
- typical non-electrical hazards in the workplace
- control measures for dealing with hazards identified.
- Conducting a risk assessment on a given work environment, documenting and assessing the risks identified
- type of metallic and non-metallic materials used in the electrotechnology industry and application of the common materials
- planning process

T3 Measuring and marking out encompassing:

- reasons for measuring and marking out
- tools used for marking out
- measuring and marking out a project accurately following correct procedures.
- sustainable energy work practices related to reducing waste when marking out.

T4 Holding and cutting encompassing:

- common tools for holding (bench vices, multi-grips, vice grips, wrenches).
- common tools for cutting metallic and non-metallic material (hacksaws, wood saws, chisels, pliers, files)
- procedure for using a range of tools for cutting, shaping, and finishing metallic and non-metallic materials
- safety procedures when using holding and cutting tools

T5 Drills and drilling encompassing:

- types of drills used in the electrotechnology industry
- sharpening twist drills
- drilling metallic and non-metallic components
- safe use of a bench drill

T6 Tapping and threading encompassing:

- type and size of commonly used threads used in electrotechnology work
- taps and tap wrenches
- tapping metallic and non-metallic components
- stock and die tools
- threading metallic and non-metallic components

T7 General Hand Tools encompassing:

- hammers used in electrotechnology work
- screwdrivers used in electrotechnology work
- spanners and sockets used in electrotechnology work
- pliers used in electrotechnology work
- assembling components applicable to electrotechnology industry using a variety of

REQUIRED SKILLS AND KNOWLEDGE

hand tools.

T8 Joining techniques encompassing:

- types of machine screws and nuts
- forms of welding (Oxy-acetylene, electric arc welding).
- forms of brazing and hard soldering
- process of soft soldering
- joining components using machine screws
- joining components using welding, brazing or soldering techniques

T9 Portable electric power tools encompassing:

- portable electric power tools (grinders, drills, jigsaws, saws)
- applications of portable electric power tools used in the electrotechnology work.
- using portable power tools.
- fabricating components using power tools (drills, grinders)

T10 Sheet metal work encompassing:

- types of sheet metal materials used in the electrotechnology work.
- names and applications of the types of fabrication materials.
- tools used with sheet metals in electrotechnology work (hacksaw, tinsnips, guillotines, punches, notching tools, folding machines)
- techniques used in fabricating sheet metal (cutting, bending, drilling/punching, joining, cutting mitres).
- marking out, cutting, bending, drilling and/or cutting and/or punching holes, joining and cutting mitred joints using sheet metal.
- sustainable energy work practices to reducing waste when fabricating using sheet metal.
- fabricating components using sheet metal and fabrication tools.

T11 Low tolerance measurement encompassing:

- tolerance
- techniques in using vernier callipers
- techniques in using micrometers.
- using vernier callipers to measure engineering components
- using micrometers to measuring engineering components

T12 Dismantling and assembly techniques encompassing:

- tools used in dismantling and assembling electrotechnology equipment (spanners, screwdrivers, bearing pullers, etc).
- procedures for ensuring the safe treatment of dismantled components.
- dismantling electrical, electronic, instrumentation or refrigeration/air conditioning piece of equipment using correct procedures.
- assembling electrical, electronic, instrumentation or refrigeration/air conditioning piece of equipment using correct procedures.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the

EVIDENCE GUIDE

Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Fabricate, dismantle, assemble of utilities industry components as described in 8) and including:

  A Selecting and using hand tools appropriate to a task correctly and safely

  B Selecting and using power tools appropriate to a task correctly and safely

  C Sharpening at least two drill bits each for use different types of material.

EVIDENCE GUIDE

D Interpreting mechanical drawings/diagrams and instructions correctly.

E Dismantle and assemble an apparatus relevant to utilities industry discipline in which competency is sought.

F Fabricate a component relevant to the utilities industry discipline in which competency is sought.

G Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to dismantling, assembling and fabricating utilities industry components.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent

9.5)

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assessment and relationship with other units	For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation, fault finding, maintenance, repair or development work functions in any of the following disciplines:

- Electrotechnology Disciplines
- Gas industry Disciplines
- ESI Transmission, Distribution and Rail Disciplines
- ESI Generation Disciplines

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.3) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

2.3) Literacy and numeracy skills

Competency Field **5)**

Utilities industry

UEENEEE104A Solve problems in d.c. circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers determining correct operation of single source d.c. series, parallel and series-parallel circuits and providing solutions as they apply to various electrotechnology work functions. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in single and multiple path circuits.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe

the essential outcomes
of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to work on d.c. electrical circuits.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	OHS risk control work preparation measures and procedures are followed.
	1.3	The nature of the circuit problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5	Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve d.c. circuit problems.	2.1	OHS risk control work measures and procedures are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Established methodological techniques are used to solve d.c. circuit problems from measure and calculated values as they apply to electrical circuit.
	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.

ELEMENT	PERFORMANCE CRITERIA	
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in d.c. circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE104A Direct current circuits

Evidence shall show an understanding of electrical fundamentals and direct current multiple path circuits to an extent indicated by the following aspects:

T1 Basic electrical concepts encompassing:

- electrotechnology industry
- static and current electricity
- production of electricity by renewable and non renewable energy sources
- transportation of electricity from the source to the load via the transmission and distribution systems
- utilisation of electricity by the various loads
- basic calculations involving quantity of electricity, velocity and speed with relationship to the generation and transportation of electricity.

REQUIRED SKILLS AND KNOWLEDGE

T2 Basic electrical circuit encompassing:

- symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram
- purpose of each component in the circuit
- effects of an open-circuit, a closed-circuit and a short-circuit
- multiple and sub-multiple units

T3 Ohm's Law encompassing:

- basic d.c. single path circuit.
- voltage and currents levels in a basic d.c. single path circuit.
- effects of an open-circuit, a closed-circuit and a short-circuit on a basic d.c. single path relationship between voltage and current from measured values in a simple circuit
- determining voltage, current and resistance in a circuit given any two of these quantities
- graphical relationships of voltage, current and resistance
- relationship between voltage, current and resistance

T4 Electrical power encompassing:

- relationship between force, power, work and energy
- power dissipated in circuit from voltage, current and resistance values
- power ratings of devices
- measurement electrical power in a d.c. circuit
- effects of power rating of various resistors

T5 Effects of electrical current encompassing:

- physiological effects of current and the fundamental principles (listed in AS/NZS 3000) for protection against the this effect
- basic principles by which electric current can result in the production of heat; the production of magnetic fields; a chemical reaction
- typical uses of the effects of current
- mechanisms by which metals corrode
- fundamental principles (listed in AS/NZS3000) for protection against the damaging effects of current

T6 EMF sources energy sources and conversion electrical energy encompassing:

- basic principles of producing a emf from the interaction of a moving conductor in a magnetic field.
- basic principles of producing an emf from the heating of one junction of a thermocouple.
- basic principles of producing a emf by the application of sun light falling on the surface of photovoltaic cells
- basic principles of generating a emf when a mechanical force is applied to a crystal

REQUIRED SKILLS AND KNOWLEDGE

(piezo electric effect)

- principles of producing a electrical current from primary, secondary and fuel cells
- input, output, efficiency or losses of electrical systems and machines
- effect of losses in electrical wiring and machines
- principle of conservation of energy

T7 Resistors encompassing:

- features of fixed and variable resistor types and typical applications
- identification of fixed and variable resistors
- various types of fixed resistors used in the Electro technology Industry. e.g. wire-wound, carbon film, tapped resistors.
- various types of variable resistors used in the Electro technology Industry e.g. adjustable resistors: potentiometer and rheostat; light dependent resistor (LDR); voltage dependent resistor (VDR) and temperature dependent resistor (NTC, PTC).
- characteristics of temperature, voltage and light dependent resistors and typical applications of each
- power ratings of a resistor.
- power loss (heat) occurring in a conductor.
- resistance of a colour coded resistor from colour code tables and confirm the value by measurement.
- measurement of resistance of a range of variable' resistors under varying conditions of light, voltage, temperature conditions.
- specifying a resistor for a particular application.

T8 Series circuits encompassing:

- circuit diagram of a single-source d.c. 'series' circuit.
- Identification of the major components of a 'series' circuit: power supply; loads; connecting leads and switch
- applications where 'series' circuits are used in the Electro technology industry.
- characteristics of a 'series' circuit - connection of loads, current path, voltage drops, power dissipation and affects of an open circuit in a 'series' circuit.
- the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
- relationship between voltage drops and resistance in a simple voltage divider network.
- setting up and connecting a single-source series dc circuit
- measurement of resistance, voltage and current values in a single source series circuit
- effect of an open-circuit on a series connected circuit

T9 Parallel circuits encompassing:

- schematic diagram of a single-source d.c. 'parallel' circuit.
- major components of a 'parallel' circuit (power supply, loads, connecting leads and

REQUIRED SKILLS AND KNOWLEDGE

switch)
- applications where 'parallel' circuits are used in the Electrotechnology industry.
- characteristics of a 'parallel' circuit. (load connection, current paths, voltage drops, power dissipation, affects of an open circuit in a 'parallel' circuit).
- relationship between currents entering a junction and currents leaving a junction
- relationship between branch currents and resistances in a two branch current divider network.
- calculation of the total resistance of a 'parallel' circuit.
- calculation of the total current of a 'parallel' circuit.
- Calculation of the total voltage and the individual voltage drops of a 'parallel' circuit.
- setting up and connecting a single-source d.c. parallel circuit
- resistance, voltage and current measurements in a single-source parallel circuit
- voltage, current, resistance or power dissipated from measured values of any of these quantities
- output current and voltage levels of connecting cells in parallel.

T10 Series/parallel circuits encompassing:

- schematic diagram of a single-source d.c. 'series/parallel' circuit.
- major components of a 'series/parallel' circuit (power supply, loads, connecting leads and switch)
- applications where 'series/parallel' circuits are used in the Electrotechnology industry.
- characteristics of a 'series/parallel' circuit. (load connection, current paths, voltage drops, power dissipation, affects of an open circuit in a 'series/parallel' circuit).
- relationship between voltages, currents and resistances in a bridge network.
- calculation of the total resistance of a 'series/parallel' circuit.
- calculation of the total current of a 'series/parallel' circuit.
- calculation of the total voltage and the individual voltage drops of a 'series/parallel' circuit.
- setting up and connecting a single-source d.c. series/ parallel circuit
- resistance, voltage and current measurements in a single-source d.c. series / parallel circuit
- the voltage, current, resistances or power dissipated from measured values of any two of these quantities

T11 Factors affecting resistance encompassing:

- four factors that affect the resistance of a conductor (type of material, length, cross-sectional area and temperature)
- affect the change in the type of material (resistivity) has on the resistance of a conductor.
- affect the change in 'length' has on the resistance of a conductor.
- affect the change in 'cross-sectional area' has on the resistance of a conductor.

REQUIRED SKILLS AND KNOWLEDGE

- effects of temperature change on the resistance of various conducting materials
- effects of resistance on the current-carrying capacity and voltage drop in cables.
- calculation of the resistance of a conductor from factors such as conductor length, cross-sectional area, resistivity and changes in temperature
- using digital and analogue ohmmeter to measure the change in resistance of different types of conductive materials (copper, aluminium, nichrome, tungsten) when those materials undergo a change in type of material length, cross-sectional area and temperature.

T12 Effects of meters in a circuit encompassing:

- selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application.
- measuring resistance using direct, volt-ammeter and bridge methods.
- instruments used in the field to measure voltage, current, resistance and insulation resistance and the typical circumstances in which they are used.
- hazards involved in using electrical instruments and the safety control measures that should be taken.
- operating characteristics of analogue and digital meters.
- correct techniques to read the scale of an analogue meters and how to reduce the 'parallax' error.
- types of voltmeters used in the Electrotechnology industry – bench type, clamp meter, Multimeter, etc.
- purpose and characteristics (internal resistance, range, loading effect and accuracy) of a voltmeter.
- types of voltage indicator testers. e.g. LED, neon, solenoid, volt-stick, series tester, etc. and explain the purpose of each voltage indicator tester.
- operation of various voltage indicator testers.
- advantages and disadvantages of each voltage indicator tester.
- various types of ammeters used in the Electrotechnology industry – bench, clamp meter, multimeter, etc.
- purpose of an ammeter and the correct connection (series) of an ammeter into a circuit.
- reasons why the internal resistance of an ammeter must be extremely low and the dangers and consequences of connecting an ammeter in parallel and/or wrong polarity.
- selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application
- connecting an analogue/digital voltmeter into a circuit ensuring the polarities are correct and take various voltage readings.
- loading effect of various voltmeters when measuring voltage across various loads.
- using voltage indicator testers to detect the presence of various voltage levels.
- connecting analogue/digital ammeter into a circuit ensuring the polarities are correct and take various current readings.

REQUIRED SKILLS AND KNOWLEDGE

T13 Resistance measurement encompassing:

- Identification of instruments used in the field to measure resistance (including insulation resistance) and the typical circumstances in which they are used.
- the purpose of an Insulation Resistance (IR) Tester.
- the parts and functions of various analogue and digital IR Tester (selector range switch, zero ohms adjustment, battery check function, scale and connecting leads).
- reasons why the supply must be isolated prior to using the IR tester.
- where and why the continuity test would be used in an electrical installation.
- where and why the insulation resistance test would be used in an electrical installation.
- the voltage ranges of an IR tester and where each range may be used. e.g. 250 V d.c, 500 V d.c and 1000 V d.c
- AS/NZS3000 Wiring Rules requirements – continuity test and insulation resistance (IR) test.
- purpose of regular IR tester calibration.
- the correct methods of storing the IR tester after use
- carry out a calibration check on a IR Tester
- measurement of low values of resistance using an IR tester continuity functions.
- measurement of high values of resistance using an IR tester insulation resistance function.
- volt-ammeter (short shunt and long shunt) methods of measuring resistance.
- calculation of resistance values using voltmeter and ammeter reading (long and short shunt connections)
- measurement of resistance using volt-ammeter methods

T14 Capacitors and Capacitance encompassing:

- basic construction of standard capacitor, highlighting the: plates, dielectric and connecting leads
- different types of dielectric material and each dielectric's relative permittivity.
- identification of various types of capacitors commonly used in the Electrotechnology industry (fixed value capacitors -stacked plate, rolled, electrolytic, ceramic, mica and Variable value capacitors – tuning and trimmer)
- circuit symbol of various types of capacitors: standard; variable, trimmer and polarised
- terms: Capacitance (C), Electric charge (Q) and Energy (W)
- unit of: Capacitance (Farad), Electric charge (Coulomb) and Energy (Joule)
- factors affecting capacitance (the effective area of the plates, the distance between the plates and the type of dielectric) and explain how these factors are present in all circuits to some extent.
- how a capacitor is charged in a d.c. circuit.
- behaviour of a series d.c. circuit containing resistance and capacitance components. - charge and discharge curves

REQUIRED SKILLS AND KNOWLEDGE

- the term 'Time Constant' and its relationship to the charging and discharging of a capacitor.
- calculation of quantities from given information: Capacitance (Q = VC); Energy (W =½CV2); Voltage (V = Q/C)
- calculation one time constant as well as the time taken to fully charge and discharge a given capacitor. (τ = RC)
- connection of a series d.c. circuit containing capacitance and resistor to determine the time constant of the circuit

T15 Capacitors in Series and Parallel encompassing:

- hazards involved in working with capacitance effects and the safety control measures that should be taken.
- safe handling and the correct methods of discharging various size capacitors
- dangers of a charged capacitor and the consequences of discharging a capacitor through a person
- factors which determine the capacitance of a capacitor and explain how these factors are present in all circuits to some extent.
- effects of capacitors connected in parallel by calculating their equivalent capacitance.
- effects on the total capacitance of capacitors connected in series by calculating their equivalent capacitance.
- Connecting capacitors in series and/or parallel configurations to achieve various capacitance values.
- common faults in capacitors.
- testing of capacitors to determine serviceability.
- application of capacitors in the Electrotechnology industry.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form

EVIDENCE GUIDE

that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solving problems in d.c. circuits as described in 8) and including:

    A Using methodological techniques to solve d.c. circuit problems from measure and calculated values

    B Determining the operating parameters of an existing circuit.

    C Altering an existing circuit to comply with specified operating parameters.

    D Developing circuits to comply with a specified function and operating parameters.

    E Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

EVIDENCE GUIDE

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in d.c. circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to single source series, parallel and series-parallel d.c. circuits as they apply to problems related to installation, fault finding, maintenance or development work functions and at least two of the following types of circuit problems and on more than one occasions:

- Determining the operating parameters of an existing circuit
- Altering an existing circuit to comply with specified operating parameters
- Developing circuits to comply with a specified function and operating parameters

RANGE STATEMENT

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrotechnology

UEENEEE105A Fix and secure electrotechnology equipment

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers fixing, securing and mounting techniques as apply in the various electrotechnology work functions. It encompasses the safe use of hand and portable power tools, safe lifting techniques, safe use of ladders and elevated platforms and the selection and safe application of fixing devices and supporting accessories/equipment.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes

of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to fix and secure equipment.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	OHS risk control work preparation measures and procedures are followed.
	1.3	The scope of work to be undertaken is obtained from documentation or from work supervisor.
	1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5	Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
	1.6	Fixing devices are selected for their suitable ability for the environment, the load they are to support and substratum's into which they are to be installed.
	1.7	Supporting accessories/equipment is selected for suitability for the environment and ability to support and protect from damage that which they are intended to support.
	1.8	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Install fixing and support devices.	2.1	Electrical isolation is arranged where work is within arm's reach of exposed conductive parts, plant or machinery in strict accordance OHS requirements and procedures.
	2.2	Other OHS risk control measures relevant to the work site are followed.
	2.3	Fixing devices are installed in accordance with manufacturer instructions.
	2.4	Support accessories/equipment is install accurately

ELEMENT	PERFORMANCE CRITERIA	
		and to comply with technical standards and job specifications.
	2.5	Work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
3 Complete fixing and support work.	3.1	OHS risk control work completion measures and procedures are followed.
	3.2	Work site is tidied and tools and equipment cleaned and securely stored.
	3.3	Appropriate personnel are notified of the work completion.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and fixing and securing equipment.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE105A Fixing and support devices/techniques

Evidence shall show an understanding of accessories and support and fixing device and methods and their use to an extent indicated by the following aspects:

T1. Device for securing and mounting electrical/electronic/instrumentation/refrigeration/ air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to hollow walls encompassing:

- types and safe application of devices for hollow wall fixing and support
- methods/techniques used to fix/support to wood, hollow wall, masonry blocks, plasterboard, panelling
- types and safe application of fixing devices used in the electrotechnology industry for wood and hollow wall structures (wood screws, coach bolts, self-tappers, self drilling, metal thread, hollow wall anchors, behind plaster brackets, stud brackets,

REQUIRED SKILLS AND KNOWLEDGE

plasterboard devices, toggle devices)
- types of tools used for hollow wall fixing and supporting.
- using various fixing methods to fix/support to hollow walls.

T2. Device for securing and mounting electrical/electronic/instrumentation/refrigeration/ air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to solid walls encompassing:

- types and safe application of devices used for solid wall fixing and support
- methods/techniques used in to fix to masonry and concrete structures
- fixing devices used in the electrotechnology industry for solid wall structures (wall-plugs, expanding concrete fixing devices, gas powered fixing tools, powder actuated fixing tools, loxins, dynabolts, chemical devices)
- regulatory requirements for use of powder fixing tools.
- hand and power tools used in fixing and supporting accessories
- using various fixing methods to fix/support to solid walls

T3. Device for securing and mounting electrical/electronic/instrumentation/refrigeration/ air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to metal fixing encompassing:

- accessories that may be fixed to metal (saddle clips, conduits, brackets, switches)
- techniques for fixing to metal
- fixing devices: coach bolts, self-tappers, metal thread bolts, hollow wall anchors, rivets
- fixing tools - spanners, screwdrivers, power screw drivers, pop riveters, files, reamers
- OH&S issues related to drilling, cutting, eye protection, metal filings, swarf, noise
- Using power drills, drill bits, change drill speeds.
- Install a fixing device and accessory capable of supporting up to 20 kg on the metal plate.

T4. Securing and mounting electrical/electronic/instrumentation/refrigeration/ air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories using fixing adhesives and tapes encompassing:

- types and safe application of using adhesives and tapes as fixing devices (load limits of different commercial products)
- accessories that may be fixed using adhesives and tapes
- techniques for the application of adhesives and tapes
- tools used to apply and cut adhesives and tapes
- hazards and safety measures when working with adhesives and chemical fixing devices (fumes, cutting, eye protection, physical contact, hand protection, ingestion)

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the

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Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Fix and secure electrical equipment as described in 8) and including:

    A Selecting fixing for loads of < 5 kg, < 20 kg and < 50 kg and suitable for the environment in which they are to be installed.

    B Installing fixing devices in compliance with manufacturers instructions

EVIDENCE GUIDE

C Installing appropriate devices for fixing to a hollow wall, brick, concrete and steel.

D Installing fixing support accessories/equipment relevant the discipline in which competency is sought.

E Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to fixing and securing electrical equipment.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with

EVIDENCE GUIDE

units covering other installation competencies.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

2.2) Literacy and numeracy skills

Competency Field **5**)

Electrotechnology

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the use of drawings, diagrams, cable schedules, standards, codes and specifications as they apply to the various electrotechnology work functions. It encompasses the rudiments for communicating with schematic, wiring and mechanical diagrams and equipment and cable/connection schedules, manuals, site and architectural drawings and plans showing the location of services, apparatus, plant and machinery and understanding the use and format of compliance standards and job specifications.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to use drawings, diagrams, schedules and manuals.	1.1	Established OHS risk control measures and procedures are followed.
		1.2	The need for drawings, diagrams, schedules or manuals is determined from the nature of the work to be undertaken.
		1.3	Established routines and procedures are followed to obtain drawings, diagrams, schedules or manuals required for the work to be undertaken.
2	Use drawings, diagrams, schedules and manuals to obtain job information.	2.1	Drawings, diagrams, schedules and/or manuals are selected, appropriate to the work being undertaken.
		2.2	Drawings, diagrams and schedules are interpreted using knowledge of drawing layouts, conventions and symbols.
		2.3	Dimensions are extracted from drawings and diagrams for application to work undertaken.
		2.4	Location of equipment is determined from equipment schedules and location diagrams.
		2.5	Manuals are reviewed to ascertain their format and where information relevant to the work to be undertaken is located.
		2.6	Information given in manuals is interpreted in relation to the work to be undertaken.
3	Use drawings, diagrams, schedules and manuals to	3.1	Drawing conventions are used in neat freehand drawings to convey information and ideas to others involved in the work to be undertaken.

ELEMENT	PERFORMANCE CRITERIA	
convey information and ideas.	3.2	Drawing conventions are used to neatly correct freehand original job drawing to show final 'as-installed' arrangement.
	3.3	Corrected drawings are forwarded to appropriate person(s) in accordance with established procedures.
4 Prepare to use compliance standards, codes and specifications.	4.1	Compliance Standards and Codes that apply to particular disciplines are sought and obtained.
	4.2	The format of compliance Standards and Codes that apply to particular disciplines are reviewed and understood.
	4.3	The purpose and format and typical content of job specifications are reviewed and understood.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and using drawings, diagrams, cable schedules, standards, codes and specifications.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE107A Drawings, diagrams and schedules

Evidence shall show an understanding of drawings, diagrams and schedules used in electrotechnology work to an extent indicated by the following aspects:

T1 Architectural drawings encompassing:

- site plans, floor plans detailed drawings and standard drawings
- architectural floor plan to determine the power and lighting or communications / audio/ video layouts required in a domestic installation
- site plan to locate the service point, consumers mains, communication services, main switchboard, distribution boards and/or builders supplies.
- standard drawing scales to determine the actual lengths represented by dimensions on an architectural drawing.
- reading and interpretation of floor plans to determine the location of the electrical/

REQUIRED SKILLS AND KNOWLEDGE

communication/audio accessories and appliances.

- Australian standard symbols used on floor plans to show the location of the accessories and appliances as detailed in an electrical schedule.

T2 Electrical drawings encompassing:

- types of electrical drawings: block, circuit, wiring and ladder diagrams
- purpose and application of block, circuit, wiring diagrams and ladder diagrams
- Australian standard symbols used to represent components on electrical diagrams.
- conventions used in and the features of circuit diagrams
- converting a circuit diagram to a wiring diagram
- identification of cable type, origin and route from a cable schedule.
- developing a cable schedule for a given installation.

T3 Circuit diagrams encompassing:

- purpose of circuit diagrams in the electrotechnology industry
- conventions used in and the features of circuit diagrams
- sketching basic circuit diagrams
- common symbols used in circuit diagram (Australian Drawing Standard AS/NZS 1102)
- developing switching charts to identify the terminals of various types of switches
- connecting equipment using circuit diagrams.

T4 Wiring diagrams encompassing:

- purpose of wiring diagrams in the electrotechnology industry
- conventions used in and the features of wiring diagrams
- sketching basic wiring diagrams
- common symbols used in wiring diagram (Australian Drawing Standard AS/NZS 1102)
- connecting equipment using wiring diagrams.

T5 Building construction drawings and diagrams encompassing:

- building types: timber frame, brick veneer, double brick and metal frame.
- identification of different types of: footings, floors, external walls, roofs, interior walls
- typical cable routes through buildings, structures and premises
- sequence of each constructional stage for brick, brick veneer and timber cottages
- identification of the stages at which the electrical/communications - first and second fixing occurs in the constructional sequence
- areas of cooperation between electrical/communications and other building trades

KS02-EE107A Introduction to regulations, compliance standards and codes

Evidence shall show an understanding of regulations, compliance standards and codes that apply to electrical work to an extent indicated by the following aspects:

REQUIRED SKILLS AND KNOWLEDGE

T1 Regulation for undertaking electrical work encompassing:

- scope of work covered by licensing in the electrotechnology industry (Electrical licensing)
- legislative requirements for ensuring electrical or electronic equipment is safe i.e. compliance requirements of electrical installations

T2 Standards philosophy and format encompassing:

- performance verses prescriptive requirements
- purpose of technical standards and their development
- role of standards Australia/New Zealand, International Organisation for Standardisation (ISO) and the International Electrotechnical Commission (IEC)
- how standards are used in compulsory and accreditation compliance schemes.
- arrangement and use of technical standards in relation to electrical and electronic work
- how to read and apply a standard.
- Standards and codes that apply to all types of electrical installations
- Standards include Standards mandated under regulation (e.g. Wiring Rules) or by an authority, deemed-to-comply standard and local service requirements (e.g. Service rules).
- Codes include those applicable to electrical safe working practices and some aspects of the Building Code of Australia.

T3 Purpose, format and content of typical job specifications encompassing:

- NATSPEC specification system - provide the most common templates on which job specification are written.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

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intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as

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specified in the performance criteria and range statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Use drawings, diagrams, schedules, standards, codes and specifications as described in 8) Range and including:

    A Identifying drawings, diagrams, schedules and manuals relevant to the work to be undertaken.

    B Interpreting drawings, diagrams, schedules and manuals correctly.

    C Using correct conventions in freehand drawings.

    D Giving correct information in freehand drawings.

    E Obtaining compliance Standards and Codes applicable to particular disciplines

    F Reviewing and understanding the format of compliance Standards and Codes that apply to particular disciplines

    G Reviewing the format and content of typical job specifications.

    H Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment

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	environment. Note: Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy. The resources used for assessment should reflect current industry practices in relation to using drawings, diagrams, schedules and manuals.
Method of assessment	**9.4**) This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5**) For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the use of drawings, diagrams, schedules, standards, codes or specifications is required.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to assembly, installation, fault finding, maintenance or development work functions in any of the following disciplines:

RANGE STATEMENT

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

Custom Content Section

Competency Field **5)**

Electrotechnology

UEENEEE124A Compile and produce an energy sector detailed report

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers complying and producing an energy sector report. It encompasses determining the safety requirements are met and all regulatory responsibilities are adhered to. The person competent in this unit must demonstrate an ability to identify information sources and collect and analyse and format information applicable to the electrotechnology industry and produce a report as required.

Application of the Unit

Application of the Unit **2)**

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

There are no prerequisite competencies for this unit.

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to develop a energy sector report.	1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
	1.2 Established techniques for report writing are reviewed are adopted in accordance with

ELEMENT	PERFORMANCE CRITERIA	
		organisation policies.
	1.3	The scope of the report is evaluated and report parameters established using a formal evaluation/survey processes.
	1.4	Criteria from other related works impacting on the report are determined from other sources.
	1.5	Identify source and availability of information.
2 Develop energy sector report.	2.1	Report is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.
	2.2	Report is developed in collaboration with all relevant personnel.
	2.3	Competent persons are identified to assist in the compilation of the report.
	2.4	Report is reviewed against all inputs and adjusted to rectify any anomalies.
	2.5	Compile report in accordance with organisation policies and procedures.
	2.6	Compile and analyse research report information
3 Obtain approval for final energy sector report.	3.1	Report is presented and discussed with person(s) of higher authority.
	3.2	Alterations to the report resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.
	3.3	Final report is presented and approval obtained from appropriate person(s).

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and compiling and producing an electrotechnology report.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE124A Energy sector detailed report writing

Evidence shall show an understanding of analysis, decision making and reporting as they apply to engineering work functions to an extent indicated by the following aspects:

T1 Communicating with personnel encompassing:

- Oral communications
- Written procedures and work instructions

T2 Communicating with suppliers

T3 Communicating with customers

T4 Purpose and extent of maintaining work activities records in an enterprise encompassing:

- Types of records for maintaining work activities in an enterprise
- Methods for recording and maintaining work records
- Work records required by regulation requirements
- Using basic computer functions encompassing:
- Starting up
- Selecting application
- Entering information
- Saving
- Printing

T5 Techniques of analysis encompassing:

- use of appropriate sampling techniques to collect data.
- types of data and classification.
- effective questionnaire design
- data collection errors.
- frequency tables.
- statistical diagrams – drawing and interpretation.
- the general shape of a frequency distribution.
- different types of diagrams.
- mean time between failures calculations

T6 Summary of statistics encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- measures of central tendency
- measures of dispersion
- a 5-point summary for a given data set, box and whisker plot distribution
- data sets comparison using measures of centre and spread
- the effect of outliers on measures of centre and spread
- use computer programs or calculators to simplify calculations

T7 Correlation and regression encompassing:

- bivariate data and scatter diagrams.
- product-moment correlation coefficient calculation and interpretation.
- difference between causation and correlation.
- equations of regression lines from bivariate data with a calculator and line plotting on a scatter diagram.
- using the equation of regression to make predictions in practical situations.
- investigation of practical problems using correlation and regression.

T8 Investigation and reporting encompassing:

- presentation of a well formatted report with a clearly stated aim.
- using the internet to obtain relevant data.
- description of the statistical method and design chosen to meet the aim of the investigation.
- statistical analysis and results reporting.
- evaluation and interpretation of the results of the investigation.
- discussion of the investigation with reference to real world applications.
- chronology of the investigation.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Compile and produce an energy sector report as described in 8) and including:

A Typical organisation policies and procedures.

B Access to a report brief to established report parameters.

C Access to appropriate person(s) to establish report requirements.

D Establishing the scope and parameters of the report.

E Determining the impact of other related works.

F Developing design brief incorporating scenarios and all requirements.

G	Appropriate computer application.
H	Identifying competencies required for the report.
I	Documenting report proposal.
J	Negotiating alterations to the proposed report successfully.

Note:
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to compiling and producing an energy sector report.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3

'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit of competency describes work conducted by technical personnel who contribute to the conduct of energy sector report writing.

This unit of competency is typically performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter being reported upon. This unit of competency should be demonstrated in accordance with the organisations

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards

RANGE STATEMENT

- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources
- Technical standards
- Regulatory requirements

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers determining correct operation of complex multiple path circuits and providing engineering solutions as they apply to various branches of electrotechnology work functions. It encompasses working safely, problem solving procedures, including using electrical measuring devices, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions.

Application of the Unit

Application of the Unit **4)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable

1.2) License to practice

contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE126A	Provide solutions to basic engineering computational problems

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to solve problems in complex multiple path circuits.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve problems in complex multiple path circuits	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used to solve circuit problems from measure and calculated values as they apply to complex multiple path circuit.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem	3.1 OHS work completion risk control measures and procedures are followed.

ELEMENT	PERFORMANCE CRITERIA
solving activities.	
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve circuit problems is documented.
	3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and provide engineering solutions for solving problems in complex multiple path circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE125A Circuit analysis

Evidence shall show an understanding of circuit analysis to an extent indicated by the following aspects:

T1 Voltage/Current Sources and Kirchhoff's Law for d.c. Linear Circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources
- calculating current and voltage in any d.c. network of up to two loops and three sources.
- Kirchhoff's Law using a circuit simulation program.
- function and operation of an electronics circuit simulation program.
- using electronics circuit simulation program.

T2 Superposition Principles for d.c. Linear Circuits encompassing:

- d.c. networks (two loops, three sources)
- using simulation programs
- calculating current and voltage in any d.c. network of up to two loops and three sources.
- Superposition theorem using a circuit simulation program.

T3 Mesh and Nodal Analysis for d.c. Linear Circuits encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- writing mesh equations for d.c. networks containing up to three loops.
- writing Nodal equations for d.c. networks containing up to three nodes.
- using mesh analysis to find currents in d.c. networks of up to two loops.
- using nodal analysis to find node voltage and branch currents in d.c. networks of up to two nodes
- using a circuit simulation program to confirm the results of Mesh analysis or Nodal analysis of d.c. networks.

T4 Thévenin's principles for d.c. Linear Circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources.
- calculating the Thévenin equivalent voltage and resistance for d.c. networks and determining the load current, voltage and power.
- converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa.
- verifying the equivalence of Thévenin equivalent circuits by measurement.

T5 Norton's principles for d.c. linear circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources.
- calculating the Norton equivalent current and resistance for d.c. networks and determining the load current, voltage and power.
- converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa.
- verifying the equivalence of Norton equivalent circuits by measurement.

T6 Phasors encompassing:

- time domain and frequency domain
- frequency, angular frequency and units of measurement
- defining rms and convert between time domain and rms phasor values for a sine wave.
- converting between angular frequency and frequency.
- using a calculator to convert between polar and rectangular forms of phasor.
- representing a.c. voltages on a phasor diagram.

T7 Complex Impedance encompassing:

- defining impedance, resistance and reactance.
- defining admittance, conductance and susceptance.
- converting between conductance to resistance.
- converting between susceptance and reactance.
- converting between impedance and admittance.
- sketching impedance and admittance diagrams.
- calculating two-component series equivalent circuits and two-component parallel equivalent circuits and convert between these forms.

T8 Series and parallel a.c. linear circuits encompassing:

- Kirchhoff's Laws

REQUIRED SKILLS AND KNOWLEDGE

- series equivalent impedance
- parallel equivalent impedance
- voltage divider and current divider rules
- calculating and measuring voltage and currents in a series a.c .circuit and draw the phasor diagram.
- calculating and measuring currents in a parallel a.c. circuit and draw the phasor diagram.
- calculating and measuring voltage and currents in a series/parallel a.c. circuit and draw the phasor diagram.

T9 Superposition principles and Kirchoff's Laws applied to a.c. linear circuits encompassing:

- calculating current and voltage in any a.c. network of up to two loops and two sources.
- using circuit simulation programs to demonstrate the superposition theorem.
- function and operation of an electronics circuit simulation program.
- entering given circuit specifications into an electronic circuit program.
- setting the circuit simulation program operation parameters including input and output values, ranges and graduation.
- producing hardcopies of the circuit and analyse results.

T10 Mesh and Nodal analysis for a.c. linear circuits encompassing:

- Mesh analysis
- Node voltages and nodal analysis
- matrix representation
- method of determinants
- writing mesh equations for a.c. networks containing up to three loops.
- writing nodal equations for a.c. networks containing up to three nodes.
- using mesh analysis to find currents in a.c. networks of up to two loops.
- using nodal analysis to find node voltage and branch currents in a.c. networks of up to two nodes.
- using a circuit simulation program to confirm the results of mesh analysis or nodal analysis of a.c. networks.

T11 Thévenin and Norton theorems applied to a.c. linear circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources.
- calculating the Thévenin equivalent voltage and impedance for a.c. networks and determining the load current, voltage and power.
- calculating the Norton equivalent current and impedance for a.c. networks and determining the load current, voltage and power.
- converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa.
- verifying the equivalence of Thévenin and Norton equivalent circuits by measurement.

T12 Star-delta conversions encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Star connections
- Star-delta transformation formula equations
- selection of appropriate conversion
- calculating the delta connected equivalent of a star connected balanced a.c. or d.c. load and vice versa.
- converting a complex non-series/parallel network to a series/parallel network by means of star-delta or delta-star conversions.
- verifying star-delta and delta-star network conversions by measurements.

T13 Complex a.c. power and maximum power transfer theorem encompassing:

- true power, reactive power and apparent power
- maximum power transfer
- calculating real, reactive and apparent power for series/parallel a.c. circuits and state the appropriate units of measurement.
- calculating the power factor of a.c. series/parallel circuits.
- drawing power triangle for a given circuit.
- calculating the load value which would consume maximum power and calculate this power for d.c. networks.
- calculating the load value which would consume maximum power in an a.c. network when the load is a pure resistance and calculate the power.
- calculating the load value which would consume maximum power in an a.c. network when the load is an impedance of variable resistance and reactance and calculate the power.
- verifying load selection by measurement.

T14 Transients encompassing:

- transients in R-C and R-L circuits
- growth and decay
- calculating voltage and currents in R-C series circuits using exponential equations.
- calculating voltage and currents in R-L series circuits using exponential equations

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this

EVIDENCE GUIDE

Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate

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evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in complex multiple path circuits as described in 8) and including:
    - A Determining the operating parameters of existing circuit.
    - B Using established problem solving methods.
    - C Taking relevant measurements accurately.
    - D Interpreting measured values appropriately.
    - E Providing effective solutions to circuit problems from measurements and calculations.
    - F Giving written justification of solutions provided.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to

EVIDENCE GUIDE

undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in complex multiple path circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Complex series-parallel circuits as they apply to problems related to engineering diagnosis and development work functions in any of the

RANGE STATEMENT

following disciplines:

- Computers
- Data Communications
- Electrical
- Electronics
- Instrumentation
- Refrigeration and Air Conditioning

- In relation to the following types of circuit problems and on at least two occasions:
  - Determining the operating parameters of an existing circuit
  - Altering an existing circuit to comply with specified operating parameters
  - Developing circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

Custom Content Section

Competency Field 5)

Competency Field **5)**

Electrotechnology

UEENEEE126A Provide solutions to basic engineering computational problems

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the application of computational processes to solve engineering problems. It encompasses working safely, applying problem solving techniques, using a range of mathematical processes, providing solutions to electrical/electronics engineering problems and justifying such solutions.

Note.
Typical engineering problems are those encountered in meeting requirements in a design brief, meeting performance requirements and compliance standards, revising systems operating parameters and dealing with system malfunctions

Application of the Unit

Application of the Unit **4)**

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a license to practice in

1.2) License to practice

the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE029B Solve electrotechnical problems

or

UEENEEG102A Solve problems in low voltage a.c. circuits

or

UEENEEH014B Troubleshoot frequency dependent circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Provide computational solutions to engineering problems.	1.1	OHS procedures for a given work area are obtained and understood
	1.2	The nature of the problems are obtained from documentation or from work supervisor to establish the scope of work to be undertaken
	1.3	Problems are clearly stated in writing and/or diagrammatic form to ensure they are understood and appropriate methods used to resolve them.
	1.4	Known constants and variable related to the problem are obtained from measured values or problem documentation.
	1.5	Alternative methods for resolving the problem are considered and where necessary discussed with appropriate person(s).
	1.6	Problems are solved using appropriate mathematical processes and within the realistic accuracy.
2 Complete work and document problem solving activities	2.1	Justification for solutions used to solve engineering problems is documented for inclusion in work/project development records in accordance with professional standards.
	2.2	Work completion is documented and appropriate person(s) notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing computational solutions to basic engineering problems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE126A Electrotechnology engineering maths

Evidence shall show an understanding of electrotechnology engineering maths to an extent indicated by the following aspects:

T1 Rational, irrational numbers and basic algebra

- simplification of expressions involving square roots and cube roots
- scientific and engineering notation
- evaluation of expressions using a calculator
- convert units of physical quantities using unity brackets
- substitute given values into formulae to find physical quantities
- manipulate algebraic expressions using mathematical operations in their correct order, the laws of indices, expansion of brackets and collecting like terms

T2 Algebraic manipulation

- Factorise algebraic expressions using common factors
- Factorise quadratic expressions using trial and error on the factors of the coefficients
- Simplify algebraic fractions using common denominators and cancelling
- Solve simple one variable equations including algebraic fractions
- Find the quotient and remainder given a linear divisor.
- Transpose formulae to find a required variable.

T3 Laws of indices

- Conversion between decimal notation, scientific notation and engineering notation
- Laws of indices: positive /negative values, multiplication/division, fractional values, index equals zero
- Logarithmic laws: multiply/divide
- solution of exponential equations using logarithms, substitution and solution of relevant formulae involving exponents or logarithms
- Graphs of exponential functions, 10x and ex and the inverses log10(x) and loge(x) functions on log-linear graphs
- Convert numbers into scientific and engineering notation using the laws of indices
- Manipulate and simplify arithmetic and algebraic expressions using the laws of indices and logarithms
- Express logarithms as indices.
- Perform logarithmic operations.
- Determine logarithms and antilogarithms to base 10, using a scientific calculator.

REQUIRED SKILLS AND KNOWLEDGE

- Determine logarithms and antilogarithms to base e, using a scientific calculator.
- Convert logarithmic values from base 10 to base e and vice versa.
- Sketch given functions on log-linear graphs

T4 Estimations, errors and approximations

- Errors in measurement
- Maximum probable error
- Show awareness of errors in measurement and of giving results in appropriate number of significant figures
- Use estimations and approximations to check the reasonableness of results.

T5 Plane figures – triangles and basic trigonometry

- Angles in a triangle
- Isosceles and equilateral triangles
- Congruent triangles
- Similar triangles
- Pythagoras' theorem
- Area of triangles
- Basic trigonometry functions
- Degrees, radians
- The ratios: sin, cos, tan, cosec, sec, cot.
- Inverse trig functions
- Sine and cosine rules

T6 Plane figures - quadrilaterals and circles

- Types and properties of quadrilaterals
- Areas and perimeters of regular quadrilaterals
- Lengths of arcs
- Angles in a circle - degrees
- Angles in a circle - radians
- Lengths of chord segments
- Tangents to circles
- Circumference and area of circles
- Names and characteristics of common polygons

T7 Graphs of Trigonometric functions

- Graph trigonometric functions and solve trigonometric equations.
- Simplify trigonometric expressions using trigonometric identities
- Convert angular measure in degrees to radians and vice versa
- Graph trigonometric functions including graphs of $y = \sin x$ and $y = \cos x$
- Using vocational applications of current or voltage as a function of time, consider changes in amplitude, consider changes in frequency.
- Examine relationships of frequency, period and angular velocity.

REQUIRED SKILLS AND KNOWLEDGE

- Sketch graphs of the form $f(t) = a \sin \varphi t$ and $f(t) = a \cos \varphi t$, where a is the peak voltage or current, and φ is the angular velocity
- Solve graphically equations of the form $f(t) = a \sin \varphi t$ and $f(t) = a \cos \varphi t$
- Show a positive or negative angle on the unit circle.
- Use symmetry properties to find trigonometric ratios for angles greater than $\pi/2$.
- Solve simple vocational problems relating period, frequency and angular velocity.

T8 Graphs of linear functions

- The number plane
- Gradient and x and y intercepts of a straight line
- Equation of a straight line length and mid-point of a straight line segment
- Function notation

T9 Simultaneous equations

- Graphical solutions
- Substitution
- Elimination
- Solve 2 linear simultaneous equations both algebraically and graphically.

T10 Matrices

- Perform the basic operations on matrices up to 3 x 3
- Manipulate matrix equations and expressions
- Recognise inverse and identity matrices up to 3 x 3 and use to solve systems of linear equations.
- Find determinants up to 3 x 3 and use to solve systems of linear equations.
- Solve problems involving more than two simultaneous equations.
- State the limitations of graphical methods of solution.
- Distinguish between a matrix and an array.
- Describe the null, diagonal and unit matrix
- Describe and identify a singular/non-singular matrix

T11 Quadratic functions

- Graphs of quadratic functions represented by parabolas and the significance of the leading coefficient.
- Graph quadratic functions and solve quadratic equations.
- Sketch and interpret the graphs of quadratic functions showing the significance of the leading coefficient and the zeros
- Solve quadratic equations by factoring or using quadratic formula
- Solve simultaneously linear and quadratic equations algebraically and geometrically
- Interpret verbally formulated problems involving quadratic and linear equations and solve.

T12 Exponential and logarithmic functions

REQUIRED SKILLS AND KNOWLEDGE

- Transform non-linear functions (including exponential) to linear forms and plot data.
- Draw curves of best fit, interpolate data and estimate constants in suggested relationships.
- Interpret verbally formulated problems involving growth and decay, and solve.
- Graph exponential and logarithmic functions and solve exponential and logarithmic equations.
- Sketch the graphs of simple exponential and logarithmic functions showing behaviour for large and small values

T13 Vectors and Phasors

- The vector as an expression of magnitude and direction
- The vector sum of x and y values in terms of magnitude and direction
- Rectangular components of vectors in the form $x = r \cos \theta$ and $y = r \sin \theta$
- Rectangular-polar and polar-rectangular conversion
- Vector addition and subtraction
- Express rectangular components of vectors in the form $x = r \cos \theta$ and $y = r \sin \theta$

T14 Complex numbers

- Definitions and notation of complex numbers
- Complex numbers as vectors on an Argand diagram
- laws of complex numbers and apply the laws in suitable calculations.
- Plot complex numbers on the Argand plane.
- Express vectors as complex numbers and perform suitable calculations.
- Calculate the conjugate of a complex number.
- Using a calculator for rectangular-polar and polar-rectangular conversions.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that

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can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
    - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement

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- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Provide computational solutions to basic engineering problems as described in 8) and including:

    A Clearly stating problems in written and diagrammatic form.

    B Obtaining known constants and variable from an appropriate source.

    C Solving problems using appropriate mathematical processes.

    D Documenting justification of solutions provided in accordance with professional standards.

    E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the

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	approved industry simulation policy. The resources used for assessment should reflect current industry practices in relation to providing computational solutions to basic engineering problems.
Method of assessment	**9.4**) This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5**) There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to problems that apply to engineering diagnosis development and work functions with the following attributes:

- working safety
- problem solving techniques application
- range of mathematical processes used
- provision electrical/electronics engineering problems solutions
- such solutions justification

Providing computational solutions to basic engineering problems shall be demonstrated in any of the following disciplines:

RANGE STATEMENT

- Computers
- Data Communications
- Electrical
- Electronics
- Instrumentation
- Refrigeration and Air Conditioning

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrotechnology

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers identifying occupational health and safety hazard and risks and documenting control measures. It encompasses identifying workplace hazards, assigning levels of risk, developing control measures to eliminate and/or mitigate risks, reviewing risk control measures and maintaining documentation of hazards, risk control measures and their application in accordance with compliance procedures.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this competency standard unit contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this competency standard unit is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

This unit addresses information, processes and techniques for the application of occupational health and safety specific to working with electrotechnology and is essential for employees without managerial or supervisory responsibilities

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes

of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Identify and document hazards and risks.	1.1 Hazards are identified the appropriate persons involved and in accordance with compliance procedures. Note: Typically this will relate to such things as: The type of job, Electrical conditions, Energy levels, Radiation levels, Toxic substances, Airborne particles, Pressure discharge, Explosive atmosphere, Work-site location, General work-site conditions, Specific work location, Moving parts, Tools and equipment, Workers competence and/or capacity and/or personal effects
	1.2 Risks associated with identified hazards are determined in consultation with others and documented in accordance with compliance procedures.
	1.3 Provision is made to accommodate changes to documentation should unforseen hazards be identified.
2 Assign levels of risk and develop and document control measures.	2.1 Level of risk is assigned for each identified hazard in accordance with the regulations and following compliance procedures.
	2.2 Control measures are developed for hazard, level of risk and activity to eliminate and/or mitigate the risk following compliance procedures.
	2.3 Hazard, level of risk and control measures are agreed to and documented in consultation with all involved in accordance with compliance procedures.
3 Monitor and review the control measures.	3.1 Documented control measures are made available for reference by all involved with the work.
	3.2 Control measures are modified where required in consultation with all involved with the work in accordance with compliance procedures.
	3.3 Documentation of hazards, risk control measures and their application are filed in accordance with

ELEMENT **PERFORMANCE CRITERIA**

compliance procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and documenting occupational hazards and risks in electrical.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE137A **Risks and control measures for dealing with workplace hazards**

Evidence shall show an understanding of risks and control measures for dealing with workplace hazards to an extent indicated by the following aspects:

T1 Risk management and assessment of risk encompassing:

- Principle and purpose of risk management, and
- Processes for conducting a risk assessment
- Hazard identification by job analysis and work-site inspections
- Recording hazards and assessing the risk.

T2 Hazards and risks and control measures in working on construction sites encompassing:

- Hazards include manual and mechanical handling; working at heights; working in confined spaces; noise; dusts, gases, chemicals.

T3 Hazards associated with extra-low voltage, low-voltage and high-currents encompassing:

- Arrangement of power distribution and circuits in electrical installations
- Parts of an electrical system and equipment that operate at low-voltage and extra-low voltage,
- Parts of an electrical system and equipment where high-currents are likely.

T4 Hazards and risks and control measures associated with high-voltage encompassing:

- Parts of an electrical system and equipment that operate at high-voltage,
- The terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of high-voltage
- Control measures used for dealing with the hazards of high-voltage.

REQUIRED SKILLS AND KNOWLEDGE

T5 Hazards and risks and control measures in working with low voltage equipment encompassing:

- Risks in modifying electrical installations, fault finding, maintenance and repair.
- Control measures before, while and after working on electrical installations, circuits or equipment.
- Isolation and tagging-off procedures.
- Risks and restrictions in working live.
- Control measures for working live.

T6 Hazards and risks and control measures associated with harmful, devices, materials, gases, dusts and airborne contaminant encompassing:

- Harmful devices: gas touches, welding equipment, laser equipped devises and the like.
- Harmful materials: gases (refrigerants) and some industrial cleaning agents, fibres of optical cable, thermal insulation
- Harmful airborne contaminants: fibres of thermal insulation, fibres of optical cable, fibrous cement materials, asbestos and other fibres in insulation materials.

T7 Determine the degree of the risk encompassing:

- The three recognised levels of risk are:
  - High (potential to kill or permanent disability);
  - Medium (potential to cause an injury or illness of a permanent nature);
  - Low (potential to cause a cause minor injury requiring first aid but no permanent disability)

T8 Use control measures to eliminate or control the risk encompassing:

- Hierarchy of control measures are:
  - eliminate the risk by discontinuing the activity.
  - control the risk by redesigning the equipment
  - adopt administrative procedures
  - use of personal protective equipment.
- Control measures are formally documented in Job Safety Analysis (JSAs) or Safe Work Methods (SWMs).

T9 Engaging in monitoring and reviewing processes to ensure control measures remain valid.

Evidence Guide

EVIDENCE GUIDE

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

EVIDENCE GUIDE

competency in this unit

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Document and applying measure to control occupational health and safety risks in electrotechnology work as described in 8) and including:

    A Identifying with appropriate person and in accordance with compliance procedures.

    B Determining the risk associated with identified hazards

    C Assigning the risks and developing and documenting control measures.

    D Reviewing and modifying control measures where required.

    E Recording activities.

    F Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to documenting occupational hazards and risks in electrical.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are also included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to electrotechnology work functions, including but limited to: installation, testing, inspection, fault finding, maintenance or development work functions covering:

- Relevant occupational health and safety legislation, regulations and codes of practice related to devices and systems and hazards present in residential, commercial and industrial workplaces.
- Accepted industry work procedures and the specific safety procedures and work instructions for a particular workplace or organistaion.

In any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation and Control
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology
- Energy Supply, Transmission and Distribution Networks

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

Custom Content Section

Competency Field 5)

Electrotechnology

UEENEEE190A Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the preparation of, and modification of, preliminary engineering drawings for electrotechnology/ utilities applications using manual drafting methods and computer-aided design (CAD) equipment and software from specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEED104A	Use software for engineering applications
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to produce electrotechnology/utilities engineering drawings	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed
		1.3	The extent of the work is determined from project specifications and discussion with appropriate personnel
		1.4	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
		1.5	Software tools and equipment a needed for the work are obtained in accordance with established procedures
2	Produce electrotechnology/utilities engineering drawings	2.1	OHS risk control measures and procedures for carrying out the work are followed
		2.2	The types of design drawings and layouts required are determined from project specifications
		2.3	Technical data of system components is interpreted to determine parameters that are to be included in the drawings
		2.4	Appropriate software tools are used to produce drawing based on standard protocols
		2.5	Drawings are checked for accuracy are compliance with project specifications
		2.6	Methods for dealing with unexpected situations are selected on the basis of safety and specified work

ELEMENT	PERFORMANCE CRITERIA	
		outcomes.
3 Complete and report electrotechnology/utilities engineering drawings	3.1	Completed drawings are submitted to an appropriate person to be checking for accuracy and compliance with project specifications.
	3.2	Any alterations, additions or correction instructions are followed and drawings are re-submitted for final approval
	3.3	Copies of completed drawings are filed securely in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and methods used to prepare electrotechnology/utilities engineering drawings using manual drafting and CAD applications.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE190A Electrotech/utilities engineering drawings and diagrams

Evidence shall show an understanding of electrotech/utilities engineering drawings and diagrams to an extent indicated by the following aspects

T1 Drawing fundamentals encompassing:

- principles, purpose and classification of drawings
- basic drawing terms and conventions
- symbols, codes and abbreviations used in drafting drawings
- tools and equipment used in drafting drawings
- drawing forms; sheet size and format, metric, imperial, copy fold information
- drawing routines; signatures, approvals, dates, numbers and numbering systems, design considerations/specifications, materials or component specifications, lists, titles, proprietary information, fasteners, representations, notes, charts and graphs, modifications and revision conventions
- fundamentals of drafting documentation including contents, version control, indexing and product identification (e.g. logo, trademark, software warning plates)
- delineation; line conventions and lettering, multi- and sectional view drawings,

REQUIRED SKILLS AND KNOWLEDGE

pictorial drawings, types and application of engineering drawings, conventional representations, microfilming, descriptive geometry and revolutions

- measurements; types, forms, units, symbols, reading and transfer
- sketching techniques (e.g. freehand lettering)
- basic drafting skills (e.g. drafting by hand, working with triangles, and working with a T square)
- basic drawing layout (e.g. borders and information blocks)
- line types and weights
- geometric construction principles
- use of drawing instruments and equipment to produce basic technical drawings
- drawings instruments and media usage
- usage of reproducible drawings with mechanical pencils

T2 Lettering encompassing:

- principles, concepts and applications of lettering
- terms, conventions and codes related to lettering
- construction of vertical or inclined, single-stroke Gothic lettering, numerals, and fractions, including proper spacing and guidelines
- proper lettering instruments selection
- usage of lettering techniques for notes and titles on drawings
- text style, text composition, and text placement selection and application

T3 Sketching encompassing:

- principals, practices and rules for sketching in relation to proportion, placement of the views, and drawing medium
- concepts and applications of sketching
- terms, conventions and codes related to sketching
- sketches used in industry
- usage of sketching aids for creative communication
- sketching types and their applications
- line techniques in sketching simple objects
- estimation and proportion techniques usage
- views selection for requisite applications
- blocking technique for size, shape, and details
- surface shading techniques

T4 Geometric construction encompassing:

- principles, concepts and applications of geometric construction
- terms, conventions and shapes related to geometric construction
- drawing techniques of lines, angles, circles, arcs, tangents, and polygons
- geometric construction to single-view and multi-view drawings
- graphic geometric controls

REQUIRED SKILLS AND KNOWLEDGE

- intermediate CAD commands
- plotting and printing equipment set up and configuration

T5 Multi-view orthographic projections Australian/New Zealand and industry standards encompassing:

- principals of multi-view orthographic projections
- terms, conventions and codes related to multi-view drawings
- applications and use of orthographic projections/drawings (e.g. 3rd angle)
- types and usage techniques of orthographic projection
- sketching techniques related to orthographic views
- rules for orthographic projection
- working drawing problems and specifications
- views visualisation and selection
- 1st and 3rd angle projection drawings
- lines, lettering, and drawing medium types
- fractional, decimal, and metric equations solutions
- concepts of units of measurement usage related to multi-view orthographic projections
- sectional and/or auxiliary views uses, identification and analysis
- rules for sections and auxiliary views
- geometric figures visualisation and drawing in two dimensions
- geometric figures classification and comparison
- circle properties and relationships, and circle problem solving
- drawing from a view of a model (e.g. orthographic projection)

T6 Auxiliary views encompassing:

- principles, terms and conventions usage in auxiliary views
- use and application of auxiliary views
- primary auxiliary view construction
- secondary auxiliary view construction

T7 Descriptive geometry/revolutions encompassing:

- principles, terms and conventions usage in descriptive geometry/revolutions
- graphic solutions of points, lines, and planes
- graphic solutions of intersections (e.g. lines, planes, and solids)
- true length of lines, bearing, and slope of lines
- graphic solutions of solids
- drawings construction using the revolution method

T8 Sectional views/conventions encompassing:

- principles, terms, symbols and conventions of sectional views
- use and application of sectional views
- drawing standard sectional views

REQUIRED SKILLS AND KNOWLEDGE

- use of conventional breaks
- symbols used to represent different materials
- use of cutting plans

T9 Pictorial drawings introduction and production to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of pictorial drawings
- terms, symbols, conventions and codes usage in pictorial drawings
- types and usage techniques of pictorial drawings
- line of sight application
- isometric view usage
- pictorial drawing types usage and selection
- pictorial drawings sketching
- pictorial working drawing problems and specifications
- axonometric, oblique, and perspective drawings construction
- calculations in projection plane angles
- standards for drawing pictorial drawings
- application of properties and relationships of triangles to solve geometric shapes
- conversion of an angular dimension of an orthographic to a linear dimension in a pictorial drawing
- drawing techniques of pictorial representations

T10 Dimensioning/size description and tolerancing as applied to drafting encompassing:

- principles, terms, symbols and conventions used in dimensioning and tolerancing
- terms, conventions and codes related to dimensioning
- dimensioning drawing construction using Australian/New Zealand standards
- types and usage techniques of dimensioning
- application of dimensioning to object drawings
- geometric dimensioning and tolerancing
- lines used in dimension drawings construction
- dimensioning practices applications
- dual dimensioning
- tolerancing applications
- dimensioning verification requirements
- formulas for positional tolerancing
- form, orientation, profile and runout

T11 Development layouts of various shaped objects to Australian/New Zealand and industry standards encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- principals and concepts of development layouts of various shaped objects
- terms, conventions and codes related to surface developments
- surface developments uses in Australian/New Zealand and industry standards
- basic three dimensional geometric shapes visualisation in a two dimensional plane
- cut out and construct models for checking accuracy
- rules to surface developments to produce stretchouts

T12 Layout drawings production to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of layout drawings
- terms, conventions and codes related to layout drawings
- layout drawings types and differences
- rules for layout drawings
- concepts of units of measurement usage related to layout drawings

T13 Technical illustrations drawing to Australian/New Zealand and industry standards encompassing:

- principals, concepts and purpose of technical illustrations
- terms, conventions, symbols and codes related to technical illustrations
- types and usage techniques of illustrations
- rules for technical illustration application
- techniques and applications for creating illustrations
- illustration types usage and selection
- illustration working drawing problems and specifications
- techniques and applications in the use of drawing instruments to prepare illustrations
- surface shading purpose and types, selection and analysis
- techniques and applications in airbrush renderings to detailed illustrations
- techniques and applications of CAD practices to technical illustrations
- techniques and applications of line-shaded illustrations
- concepts of units of measurement usage related to illustrations
- solutions for illustrations using fractional, metric, and decimal equations

T14 Graphs and charts production to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of basic graphs, charts and diagrams production
- terms, conventions and codes related to basic graphs, charts and diagrams production

REQUIRED SKILLS AND KNOWLEDGE

- graphs, charts and diagrams production types, usage and variations
- data configuration for graphic representation
- graph type selection per specifications and data
- basic graphic charts and diagrams interpretation
- charts and diagrams construction

T15 Thread representations encompassing:

- principles, concepts and applications of threaded fasteners
- terms, conventions and codes related to threaded fasteners
- types and usage techniques of threaded fasteners
- drawing of threads using simplified and schematic types of thread representation

T16 Working drawings encompassing:

- principles, concepts and applications of working drawings
- terms, conventions and codes related to working drawings
- types and usage techniques of working drawings
- title block, bill of materials, and schedules used in working drawings
- working drawing production requirements

T17 Care and use of equipment encompassing:

- principles, concepts and applications of various drafting instruments, equipment, and materials
- types and usage techniques of drafting instruments, equipment, and materials
- drawing materials selection for specific types of drafting projects
- drawing instruments usage as a means of technical drawings preparation for accuracy, and readability
- Computer Aided Design (CAD) station components identification
- CAD setup requirements to complete a basic drafting problem

T18 Computer-aided drawing design (CAD) - basics encompassing:

- principles, terms, symbols and conventions usage in computer-aided drawing design (CAD)
- concepts and applications of CAD and related application commands
- types of CAD hardware
- CAD standards encompassing: file presentation; layering standards - sorting graphic data including data groups, principal data, supporting data, layering naming convention, colour assignment standard (layer colours and pen weights), provision for creation of new layers; blocks standards - real blocks object,

REQUIRED SKILLS AND KNOWLEDGE

common block objects, symbol objects, block library, block naming; text style standards - text styles naming, text height; dimension styles standards - dimension style naming; linetype standards; title blocks and graphic scales - title block set-up, information title blocks, drawing scales; systems of measurement and preferred scales - drawing scales

- DOS and Windows application definitions
- techniques and practices in the application of program assist and editing commands
- view and display commands (e.g. zooming and panning)
- query commands to extract drawing data
- techniques and practices in the application of changes to text styles text entering and editing
- existing drawing modifications
- working with multiple drawings using cut and paste, etc.
- components and symbol libraries creation, editing and retrieval
- plotting drawings to the proper scale
- scaling techniques applications
- layering techniques applications
- Line-Type (LT) scale usage
- drawing techniques application
- drawing setups to applicable standards (e.g. settings, layers, line types, and widths)
- 2-D drawing creation
- Cartesian, polar, absolute, and relative coordinates usage in drawing lines and shapes
- techniques and practices in the application of geometric construction
- techniques and practices in the application of text to a drawing
- techniques and practices in altering font options
- techniques and practices in the application of laying out, drawing, and completing orthographic drawings
- techniques and practices in the application of drawing objects in isometric using isometric drawing commands
- techniques and practices in the application of completing primary auxiliary drawings on the CAD equipment
- techniques and practices in the application of CAD to draw screw threads
- techniques and practices in the application of making, setting, and using layers and blocks

T19 Basic production fabrication drawings to Australian/New Zealand and industry standards encompassing:

- principles, terms, symbols, codes and conventions usage in production fabrication drawings

REQUIRED SKILLS AND KNOWLEDGE

- types and usage techniques of detailed and assembly drawings
- detailing: encompassing principals, concepts and applications of detailing; terms, conventions and codes related to detailing; detailing types, application and selection; different fabrication processes and identification of machine parts; rules for drawing machine part details; concepts of units of measurement usage related to detailing; application of properties and relationships of triangles and circles to solve geometric shapes related to detailing
- assembly drawings: encompassing principals, concepts and applications of assembly drawings; terms, conventions and codes related to assembly drawings; different assembly processes and identification of machine part assemblies; rules for drawing assembly drawings; concepts of units of measurement usage related to assembly drawings; application of properties and relationships of triangles and circles to solve geometric shapes related to assembly drawings
- machine assembly drawing production
- detail drawings standard machine fits applications
- drawings for welded component parts
- parts list (e.g. balloons) development
- file and/or drawing for CAD/CAM applications
- gears drawings
- cams drawings
- threads and fasteners (e.g. bolts, pins, and keys) use and applications
- drawings for metal bending and fabricating
- standard fits, finishes, and tolerances to a machine drawing applications
- manufacturing processes (e.g. machine, metal forming, and CNC)

T20 Pattern development encompassing:

- principles, concepts and purpose of pattern development
- terms, conventions and codes related to pattern development
- types and usage techniques of pattern development and related drawings
- application of pattern development and intersection techniques
- intersections of geometric surfaces development techniques and applications
- flat surfaces development techniques and applications
- construct of objects from the intersection

T21 Maps and profiles design and production to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of maps and profiles design and production
- terms, conventions and codes related to maps and profiles design and production
- maps and profiles design and production types and uses
- rules for cartography

REQUIRED SKILLS AND KNOWLEDGE

- components selection and transit usage
- symbols usage and applications for topography
- application of properties and relationships of triangles to solve geometric problems; trigonometric relations to solve right triangles, law of sines and cosines to solve triangles

T22 Pipe/plumbing drawings basics encompassing:

- principles, purpose, terms and conventions usage in pipe/plumbing drawings
- applicable codes, symbols and abbreviations
- piping symbols, fittings, fixtures, and valves
- types of piping systems and usage techniques in pipe drawings
- principles of pneumatics and hydraulics
- pneumatics and hydraulic schematics production
- plumbing schematics production
- techniques and applications in creating drawings of piping symbols and systems

T23 Structural steel, welding and sheet metal drawings basics encompassing:

- principles, terms and conventions usage in structural steel, welding and sheet metal drawings
- applicable codes (e.g. OHS, Standards Australia/Zealand, building codes and regulations, related standards and codes)
- classification of major structural and welding components
- rules and symbols used in structural and welding drawings
- structural steel shapes
- steel-framing materials
- detail and assembly drawings (including beam connections) with bill of materials
- steel frame plan drawings production
- types and usage techniques of structural and welding drawings
- techniques and applications in creating structural drawings using measuring, labeling, and symbol procedures
- techniques and applications used in drafting the processes for joining metal and standard symbols for welding
- techniques and applications in creating welding drawings complete with weld symbols
- sheet metal layout methods and procedures
- representative sheet metal drawings
- sheet metal drawings for CAD/CAM applications

T24 Ink overlay drawings produced to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of ink overlay drawings production
- terms, conventions and codes related to ink production
- drawing specifications identification and analysis

REQUIRED SKILLS AND KNOWLEDGE

- rapid graph equipment usage procedures

T25 Drawings reproductions to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of drawing reproductions
- terms, conventions and codes related to processes related to drawing reproductions
- rules for reproducing drawings
- various machines usage and selection in the reproduction process

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling

employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Prepare electrotechnology/ utilities engineering drawings using manual drafting and CAD applications as described in 8) Range and including:

A	Carrying out freehand sketching of simple electrotechnology/ utilities products, and components using pictorial methods to generate two and three dimensional electrotechnology/ utilities images encompassing a range of standard components, such as devices, components, parts, equipment and structures, sketched together with other solid and hollow items.
B	Preparing and modifying preliminary electrotechnology/ utilities drawings and diagrams using manual drafting methods, techniques, procedures and devices
C	Preparing and modifying preliminary electrotechnology/ utilities drawings and diagrams using computer-aided design equipment and software
D	Notating type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology/ utilities drawings, briefs and/or specifications.
E	Obtaining specifications from design information, customer requirements, sketches, preliminary layouts and/or field investigations.
F	Drawing single part components, simple electrotechnology/ utilities assemblies for fabrication, assembly or installation of products encompassing dimensions, fabrication and/or installation notes, and parts lists from predetermined dimensions, associated tolerances and design specifications
G	Using CAD equipment and related commands and drawing environments to produce setting out details; drawing template for a range of paper sizes, the drawing title and scale used, date of drawing and other relevant information; and/or working drawings
H	Stating the purpose and usage of a variety of atypical electrotechnology/ utilities drawings for electrotechnology and electricity supply industry applications

I	Generating a variety of CAD drawings from 2D components to 3D models by applying relevant techniques and processes, extracting properties, applying basic rendering techniques and incorporating pre-prepared symbols to construct electrotechnology/ utilities diagrams and assembly drawings to produce section, surface modelling, solid modelling, and wireframe modelling views
J	Applying safety precautions when working with CAD equipment

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to preparing electrotechnology/ utilities engineering drawings using manual drafting and CAD applications

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires

that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the preparing electrotechnology/ utilities engineering drawings using manual drafting and CAD applications

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the preparation of electrotechnology/utilities engineering drawings using manual drafting and CAD applications:

- Covers mechanical, fabrication, fluid power
- Drawings include component drawings for fabrication, assembly and sub-assembly drawings, installation drawings, fault location aids such as flow diagrams and modifications (version control), and conversion between drawing types
- Engineering drafting specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards for electrotechnology/ utilities applications
- Manual drafting methods, techniques, procedures and devices
- Type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology / utilities related engineering drawings, briefs and/or specifications
- Sketching methods, techniques, procedures and devices encompassing freehand sketching
- Specifications may be obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations

RANGE STATEMENT

- Geometric construction
- Multi-view orthographic projections
- Auxiliary views
- Descriptive geometry/revolutions
- Sectional views/conventions
- Pictorial drawings
- Dimensioning/size description and tolerancing
- Development layouts
- Layout drawings
- Technical illustrations
- Graphs and charts
- Thread representations
- Working drawings
- Technical drawing equipment including computer-aided drawing design (CAD) applications, peripherals and devices
- Care and use of equipment
- Safety precautions when working with CAD equipment
- Fabrication drawings
- Pattern development
- Maps and profiles design
- Pipe/plumbing drawings
- Structural steel and sheet metal drawings
- Ink overlay drawings production
- Drawings reproductions
- Organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance instructions/manuals for products and systems
- Organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures
- Organisational procedures for collaborating with the client, key stakeholders and other staff in the selection of the preferred option

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

UEENEEE191A Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the preparation of, and modification of, preliminary electrotechnology/utilities drawings and diagrams using manual drafting methods, techniques, procedures and devices and computer-aided design equipment and software from specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEED104A	Use software for engineering applications
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEE104A	Solve problems in d.c. circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE190A	Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed
		1.3	The extent of the work is determined from project specifications and discussion with appropriate personnel
		1.4	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
		1.5	Software tools and equipment a needed for the work are obtained in accordance with established procedures
2	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and	2.1	OHS risk control measures and procedures for carrying out the work are followed
		2.2	The types of design detailed drawings and layouts required are determined from project specifications

ELEMENT	PERFORMANCE CRITERIA	
software.	2.3	Technical data of system components is interpreted to determine parameters that are to be included in the detailed drawings
	2.4	Appropriate software tools are used to produce detailed drawings based on standard protocols
	2.5	Detailed drawings are checked for accuracy are compliance with project specifications
	2.6	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
3 Complete electrotechnology/utilities drawings using manual drafting and CAD equipment and software	3.1	Completed drawings are submitted to an appropriate person to be checked for accuracy and compliance with project specifications.
	3.2	Any alterations, additions or correction instructions are followed and drawings are re-submitted for final approval
	3.3	Copies of completed drawings are filed securely in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and the preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE191A Electrotechnology/ utilities drawings and diagrams

Evidence shall show an understanding of electrotech/utilities drawings and diagrams to an extent indicated by the following aspects

T1 Electrotechnology/ utilities drafting fundamentals encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- principles, concepts and purpose of electrotechnology/ utilities drafting
- terms, conventions and codes related to electrotechnology/ utilities drafting
- rules and symbols used in electrotechnology/ utilities drafting
- types and usage techniques of electrotechnology/ utilities drawings
- techniques and applications for creating graphic symbols charts
- techniques and applications in composing block diagram drawings

T2 Standard drawing sheets and drawing sheet layout encompassing

- standard drawing sheet borders
- standard drawing sheet scale
- standard drawing sheet editing - routine
- standard drawing sheet editing - title block
- standard drawing sheet editing - revision blocks
- drawing sheet layout for small electrotechnology/ utilities projects
- drawing sheet layout for large electrotechnology/ utilities projects
- drawing sheet layout for signing and markings projects
- key plan sheets
- drawing layers
- line types

T3 Electrotechnology/ utilities drawings line work, symbols, lettering and techniques production to Australian/New Zealand and industry standards encompassing:

- principles of correct drafting technique
- principles, concepts and purpose of electrotechnology/ utilities drawings
- terms, symbols (including sectional symbols), conventions and codes related to electrotechnology/ utilities drawings
- rules for drafting electrotechnology/ utilities drawings
- types and usage techniques of electrotechnology/ utilities drawings
- relationship between components and symbols used in drafting applications
- techniques and applications for production of electrotechnology/ utilities drawings

T4 Sketching techniques for electrotechnolgy/ utilities applications encompassing:

- lines and letters
- shapes
- solids
- axonometric views
- building sketch
- isometric views
- object sketch
- perspective; building interior perspective sketch
- detail labelled sketch

REQUIRED SKILLS AND KNOWLEDGE

T5 Pole and structure elevations encompassing:

- elevation sheet layout
- elevation labeling
- concrete bases
- luminaire pole elevations
- signal pole elevations
- service pole elevations
- sign pole elevations
- sign bridge and cantilever elevations
- breakaway sign structures
- wood post sign structures

T6 Survey base plan drawings encompassing:

- survey base plan scale
- survey base plan
- survey base plancontents
- modelspace and paperspace
- external reference (xref) drawings
- viewports

T7 Auxiliary Views and Revolutions encompassing:

- principles, concepts and purpose of auxiliary views and revolutions
- terms, conventions and codes related to auxiliary views and revolutions
- rules of revolutions
- types and usage techniques of auxiliary views, auxiliary reference planes and revolutions
- techniques and applications in finding the true size of an oblique surface
- secondary auxiliary view drawing techniques and applications
- applications of revolutions
- usage of the axis of revolution to draw the true shape of an oblique view

T8 Map Drafting encompassing:

- types and usage techniques of map drafting and illustrated maps
- techniques and applications of plat surveys and set plans
- techniques and applications of contour maps using profile coordinates
- map reading techniques and applications
- map drawing techniques and applications

T9 Civil/GIS (Geographic Information Systems) drawings basics encompassing:

- principles, terms and conventions usage in civil GIS drawings
- land surveying techniques (e.g. property line, corners, symbols, coordinates, base line, and typical sections)

REQUIRED SKILLS AND KNOWLEDGE

- GIS and Global Positioning Systems (GPS) uses and applications
- land survey plot production from a written description
- manual and computer methods calculation of area
- contour plans
- profile drawings

T10 Architectural and site plan drawings for electrotechnology/ utilities applications encompassing:

- principles, purpose, terms and conventions usage in basic architectural drawings
- typical scales
- base plan symbols and labels
- electrotechnology/ utilities site plan symbols and labels
- signing and markings site plan symbols and labels
- architectural design and planning principles
- elevation drawings
- architectural symbols and abbreviations usage
- floor plans layout and production
- basic construction terminology and materials
- perspectives and pictorials
- typical wall and building sections with necessary details
- applicable building codes
- as-built floor plan measurement, sketching, and drafting
- usage of schedules in freehand architectural style lettering
- styles of architecture
- fundamentals and design function in residential design
- site plans production
- foundation plan production

T11 AutoCAD basics for electrotechnology/ utilities applications encompassing:

- operating system fundamentals encompassing: principals, concepts and applications of CAD hardware; terms, conventions and codes related to CAD hardware; CAD hardware type and variation; system specifications interpretation and usage; I/O devices identification; computer components installation and configuration arrangements and application
- CAD filing and naming conventions
- opening program/closing and saving drawings
- basic drafting commands encompassing: line; circle; spline; rectangle
- basic modification commands encompassing: erasing; copy; mirror; block; trim; extend
- layout and plotting
- design centre encompassing: electrical symbols; electronic symbols
- AutoCAD and lists

REQUIRED SKILLS AND KNOWLEDGE

- components and symbols in CAD
- mass storage and file compression
- network operating systems, protocols, and cabling systems
- researching hardware and software
- installation and configuration of operating systems
- plotting solutions
- security issues
- system maintenance
- user interface
- object creation and modification
- editing
- layers
- properties
- paper space and model space concepts
- dimensioning and dimensioning variables
- blocks
- attributes
- three dimensional construction
- solid modelling and scripts
- library construction
- database manipulation
- data extraction
- circuit simulation
- wiring symbols - motor and generator, AC and DC; wiring junctions; grounds; distinguishing power and control conductors; normally open and normally closed contacts; series and shunt coils; circuit protection devices - overload relay w/thermal element, fuse, circuit breakers; push button - disconnect switches, momentary contact, maintained contact; meters; resistors; transformers - power, current, potential, auto-transformers

T12 Drawing numbering, file names and digital file storage encompassing:

- drawing series and version control
- drawing sheet numbering
- drawing file names
- drawing storage
- drawing file

Evidence Guide

EVIDENCE GUIDE

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software as described in 8) Range and including:

A Carrying out freehand sketching of simple electrotechnology/ utilities products, circuits and components using pictorial methods to generate two and three dimensional electrotechnology/ utilities images encompassing a range of standard components, such as devices, components, parts, equipment and structures,

	sketched together with other solid and hollow items.
B	Preparing and modifying preliminary electrotechnology/utilities drawings and diagrams using manual drafting methods, techniques, procedures and devices
C	Preparing and modifying preliminary electrotechnology/utilities drawings and diagrams using computer-aided design equipment and software
D	Notating type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology/ utilities drawings, briefs and/or specifications.
E	Obtaining specifications from design information, customer requirements, sketches, preliminary layouts and/or field investigations.
F	Drawing single part components, simple electrotechnology/ utilities assemblies and circuits for fabrication, assembly or installation of products encompassing dimensions, fabrication and/or installation notes, wiring schedules and parts lists from predetermined dimensions, associated tolerances and design specifications
G	Using CAD equipment and related commands and drawing environments to produce setting out details; drawing template for a range of paper sizes, the drawing title and scale used, date of drawing and other relevant information; and/or working drawings
H	Stating the purpose and usage of a variety of typical electrotechnology/utilities drawings for electrotechnology/ utilities industry applications
I	Generating a variety of CAD drawings from 2D components to 3D models by applying relevant techniques and processes, extracting properties, applying basic rendering techniques and incorporating pre-prepared symbols to construct electrotechnology /utilities diagrams and assembly drawings to produce section, surface modelling, solid modelling, and wireframe modelling views
J	Applying safety precautions when working with CAD equipment

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with **9.5)**

other units

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the development of electrotechnology/utilities drawings is required.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software:

- Drawings include layouts, assembly and installation drawings, and modifications (version control), and conversion between drawing types
- Electrotechnology drafting specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards
- Manual drafting methods, techniques, procedures and devices
- Type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology drawings, briefs and/or specifications
- Sketching methods, techniques, procedures and devices encompassing freehand sketching
- Specifications may be obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- Electrotechnology drawings line work, symbols, lettering and techniques
- Sketching techniques
- Technical drawing equipment including computer-aided drawing design (CAD) applications, peripherals and devices including AutoCAD basics for electrotechnology applications and related commands
- Safety precautions when working with CAD equipment
- Pole and structure elevations
- Survey base plan drawings
- Auxiliary Views and Revolutions
- Map Drafting
- Civil/GIS (Geographic Information Systems) drawings basics
- Architectural and site plan drawings
- Organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance

RANGE STATEMENT

instructions/manuals for products and systems

- Organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures
- Organisational procedures for collaborating with the client, key stakeholders and other staff in the selection of the preferred option

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

UEENEEE192A Produce detailed electrotechnology /utilities drawings using computer aided design equipment and software

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the production of, and modification and maintenance of, detailed electrotechnology/utilities drawings and diagrams using computer-aided design (CAD) equipment and software from specifications, layouts, sketches or verbal instructions in conformance with Australian Standards, enterprise standards and/or design brief.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEED104A	Use software for engineering applications
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEE104A	Solve problems in d.c. circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE190A	Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications
UEENEEE191A	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to produce detailed electrotechnology /utilities drawings	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed
		1.3	The extent of the work is determined from project specifications and discussion with appropriate personnel
		1.4	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
		1.5	Software tools and equipment a needed for the work are obtained in accordance with established procedures
2	Produce detailed electrotechnology	2.1	OHS risk control measures and procedures for carrying out the work are followed

ELEMENT	PERFORMANCE CRITERIA	
/utilities drawings.	2.2	The types of design detailed drawings and layouts required are determined from project specifications
	2.3	Technical data of system components is interpreted to determine parameters that are to be included in the detailed drawings
	2.4	Appropriate software tools are used to produce detailed drawings based on standard protocols
	2.5	Detailed drawings are checked for accuracy are compliance with project specifications
	2.6	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
3 Complete detailed electrotechnology /utilities drawings.	3.1	Completed detailed drawings are submitted to an appropriate person to be checked for accuracy and compliance with project specifications.
	3.2	Any alterations, additions or correction instructions are followed and detailed drawings are re-submitted for final approval
	3.3	Copies of completed detailed drawings are filed securely in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and using drawings, diagrams, schedules and manuals.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

REQUIRED SKILLS AND KNOWLEDGE

KS01-EE192A Detailed electrotechnology /utilities drawings

Evidence shall show an understanding of detailed electrotechnology /utilities drawings to an extent indicated by the following aspects

T1 Detailed working drawings encompassing:

- definition of detailed working drawings
- usage and types of detailed working drawings
- composition and layout of detailed working drawings
- preparation of detailed working drawings

T2 Advanced (master) sketching techniques encompassing:

- lines and letters
- shapes
- solids
- axonometric views
- building sketch
- isometric views
- object sketch
- perspective; building interior perspective sketch
- detail labelled sketch
- complex surfaces with tangent and curvature continuities
- surfaces manipulation using editing tools
- surfaces analysis for quality and desired characteristics

T3 Drafting/modelling electrotechnology/ utilities encompassing:

- standard documentation practices for block diagrams
- wiring diagrams
- circuit schematics
- control circuits
- creating one-line diagrams
- standard PCB layouts
- printing wiring assemblies
- art masters

T4 Electrotechnology/ utilities related drawings encompassing:

- charts and graphs; encompassing alternating current, frequency, electromagnetisms, signals, transmission
- measuring devices and gauges
- power sources, transformers, alternators, motors and related applications
- earthing
- conduits, boxes and fittings, harnesses, cable trays and ducts
- conductor terminations, splices, installations and wiring schedules

REQUIRED SKILLS AND KNOWLEDGE

- busways
- electric services installations
- protection devices -over current and voltage, circuit breakers, and fuses
- switches, contactors and relays
- control systems and devices
- HV devices and apparatus
- cabinet and panel layouts
- plot and floor plans
- electric lighting
- analogue and digital systems, circuits, electronic components and devices - connections; resistors; capacitors; magnetic devices; piezoelectric devices, crystals and resonators; transducers, sensors and detectors; solid state components and semiconductors; display technologies – filament, LED, LCD, discharge devices, thermionic valves, vacuum tubes; assemblies, modules; prototyping aids; mechanical accessories
- data networks, communication and telecommunications equipment and devices
- pneumatic and hydraulic circuits, including related piping ware and components

T5 AutoCAD – functional for electrotechnology/ utilities encompassing:

- user coordinates systems
- Right-Hand Rule
- 2D geometry extrusion
- 2D views from 3D models and visa-versa
- user coordinate systems creation
- 3D wireframe geometry creation
- 3D faces on wireframe geometry placement
- 3D geometry viewing
- surfaces construction
- working drawings generation
- drawing set up using model space and paper space; encompassing printing and plotting
- plotting
- rendering
- 3D models construction
- 3D surface models construction
- 3D models display from different vantage points
- orthographic drawings constructed from 3D models
- rendered images creation
- solid modelling construction using Boolean operations
- scripts writing and tool button macros application
- organisation of writing scripts and tool button macros commands
- advanced drawing, editing, and configuration procedures application

REQUIRED SKILLS AND KNOWLEDGE

- basic user-level system customisation
- design environment
- basic workflow

T6 AutoCAD – project basics encompassing:

- project manager
- project drawing list
- projects progression/stages
- projects copy and activation

T7 AutoCAD – schematic wiring, editing, components and reporting encompassing:

- wiring and ladders
- wire types, wire numbers
- source and destination signal arrows
- multiple phase and multi wire circuits
- circuits
- connectors and point-2-point wiring
- basic editing utilities
- miscellaneous tools
- data tools
- re-sequence and retag drawings
- using the auditing tools
- schematic symbol annotation
- inserting schematic symbols
- swapping and updating blocks
- inserting schematic components from lists
- generating schematic reports

T8 AutoCAD – panel layouts encompassing:

- creating panel layouts from schematic lists
- din rail utility usage
- panel footprints
- terminal strip editor usage
- panel layout annotation and reports

T9 AutoCAD – PLC modules encompassing:

- PLC I/O modules
- PLC modules builder
- PLC database file editor; encompassing insert and edit in parametric PLC modules, nonparametric PLC modules, and stand-alone PLC I/O points
- PLC I/O address-based tagging
- spreadsheet to PLC I/O utility

REQUIRED SKILLS AND KNOWLEDGE

T10 AutoCAD - detailed settings and configurations – advanced commands encompassing:

- drawing properties
- project properties
- creating wire types
- reference files usage
- creating drawing templates
- installation and search paths

T11 AutoCAD – detailed customised components and customised detailed data encompassing:

- schematic symbols
- icon menu system
- panel footprints
- part catalogue databases usage
- pin list database editor
- title block update and attributes
- terminal properties editor
- reference files usage

T12 AutoCAD – advanced auditing tools, automation tools and integration encompassing:

- auditing tools
- trouble shooting tools
- updating schematics from spreadsheets
- generating automatic reports
- AutoCAD integration
- din rail editor
- footprint with wire annotation
- conduit tools
- cables management

T13 AutoCAD – database management and productivity tools encompassing:

- title block attributes automation tools update
- schematics update spreadsheets
- adding wire data to footprints
- managing cables
- using the circuit builder
- working with peer-to-peer

T14 Drawings production using CAD application programs encompassing:

- principals, concepts and applications of drawings production using CAD

REQUIRED SKILLS AND KNOWLEDGE

application programs
- terms, conventions and codes related to drawings production using CAD application programs
- drawing production types using CAD application programs
- CAD advanced commands identification and application for drawings
- CAD advanced commands identification and application for editing drawings
- CAD advanced commands identification and application for hardcopy drawings
- techniques and applications in producing detailed architectural drawings of a floor plan, elevation, and exterior wall section for a residential structure related to electrotechnology/ utilities applications

T15 Utility programs disk and file management encompassing:

- principals, concepts and applications of disk and file management of utility programs
- terms, conventions and codes related to disk and file management of utility programs
- disk operating system commands identification and usage
- utility commands identification and usage
- commands for word processing identification and usage

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace

procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Producing detailed electrotechnology /utilities drawings using computer aided design equipment and software as described in 8) Range and including:

A	Producing, modifying and maintaining detailed electrotechnology/ utilities drawings and diagrams using computer-aided design (CAD) equipment and software
B	Producing master sketches of complex electrotechnology/ utilities drawings using pictorial methods and scaling to generate relevant dimensional electrotechnology/ utilities images
C	Identifying, selecting and determining uses for a range of materials and equipment used in electrotechnology/ utilities engineering drafting applications
D	Drawing single and multi-part components and detailed electrotechnology/ utilities assemblies
E	Using advanced CAD equipment commands and drawing techniques and processes to produce detailed electrotechnology/utilities drawings
F	Using filing systems for managing, entering and/or retrieving technical information from computer related database programs
G	Applying safety precautions when working with CAD equipment

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to using drawings, diagrams, schedules and manuals.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the production of detailed drawings using computer aided design equipment and software for other disciplines.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to producing detailed electrotechnology /utilities drawings using computer aided design equipment and software covering:

- Drawings include detailed circuit and wiring diagrams/schedules, block diagrams, schematics, printed circuit board layouts, assembly and installation drawings, modification drawings, and conversion between drawing types.
- Electrotechnology/ utilities specifications, layouts, sketches or verbal instructions in conformance with Australian Standards, enterprise standards and/or design brief.
- Master sketches methods, techniques, procedures and devices encompassing freehand sketching
- Type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology/ utilities engineering drawings, briefs and/or specifications
- Specifications may be obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- Materials and equipment used in electrotechnology/ utilities engineering applications by selecting the correct type, form and size of materials and equipment from information, abbreviations and symbols supplied on detailed electrotechnology/ utilities engineering drawings, briefs and/or specifications
- Advanced computer-aided design (CAD) equipment commands and drawing techniques and processes
- CAD application programs and advanced tools
- Utility programs disk and file management
- Filing systems management including entering/retrieving technical information from computer related database programs for the production, modification and/or maintenance of detailed electrotechnology/ utilities drawings
- Safety precautions when working with CAD equipment

RANGE STATEMENT

- Detailed working drawings
- Drafting/modelling electrotechnology/ utilities
- Detailed electrotechnology/ utilities drawings including a representative array of relevant 2D and 3D CAD drawings
- Single and multi-part components and detailed electrotechnology/ utilities assemblies for fabrication, assembly, installation and/or modification of products encompassing dimensions encompassing dimensions; fabrication, assembly, installation and/or modification notes, circuit/wiring layouts/schedules and parts lists from specified dimensions, associated tolerances and design specifications.
- Architectural drawings for electrotechnology/ utilities applications
- Organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance instructions/manuals for products and systems
- Organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures
- Organisational procedures for collaborating with the client, key stakeholders and other staff in the selection of the preferred option

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

UEENEEG006A Solve problems in single and three phase low voltage machines

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers ascertaining correct operation of single and three phase machines and solving machine problems as they apply to servicing, fault finding, installation and compliance work functions. It encompasses safe working practices, machine connections circuit arrangements, issues related to machine operation, characteristics and protection and solutions to machine problems derived from calculated and measured parameters.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to solve single and three phase low voltage machines problems.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4	The nature of the machine (s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.6	Sources of materials that may be required for the work are established in accordance with established

ELEMENT	PERFORMANCE CRITERIA	
		procedures.
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve single and three phase low voltage machine problems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Established methods are used to solve machine problems from measure and calculated values as they apply to single and three-phase low voltage machines.
	2.5	Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
	2.6	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.7	Problems are solved without damage to machines, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve machine problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in single and three phase low voltage machines.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG006A Single and three-phase transformers

Evidence shall show an understanding of single and three phase transformers to an extent indicated by the following aspects:

T1 Transformer construction encompassing:

- types of lamination style and core construction used in single-phase, three phase, double wound, auto transformers and instrument transformers.
- identification of different winding styles/types used in transformers.
- methods used to insulate low and high voltage transformers.
- construction of transformer tanks for distribution transformers.
- transformer auxiliary equipment. (Bushings, surge-diverters, tap-changers, hot oil & winding indicators, breather, Buchholz relay and conservator).
- function of transformer auxiliary equipment.
- types of information stated on transformer nameplates.
- application of transformers.
- performing basic insulation resistance, continuity and winding identification tests.

T2 Transformer operation encompassing:

- principles of mutual induction of a transformer.
- factors that determine the induced voltage in a transformer winding.
- determining the value of a transformers secondary voltage and current given one winding's electrical details and turns ratio.
- identification of voltage and current components of a phasor diagram for a transformer on no-load.
- principles of power transferred from the primary to secondary when a load is connected using a phasor diagram neglecting impedance drops.
- selecting transformers for specific application/s.
- safety features specified in AS/NZS3000 with respect to transformers and isolating transformers.

T3 Transformer losses, efficiency and cooling encompassing:

- power losses which occur in a transformer.

REQUIRED SKILLS AND KNOWLEDGE

- tests which allow the power losses of a transformer to be determine.
- determination of transformer losses and efficiency using test results.
- relationship between transformer cooling and rating.
- methods used for natural and forced cooling of transformers.
- properties of transformer oil.
- tests conducted on transformer oil.

T4 Transformer voltage regulation and percent impedance encompassing:

- voltage regulation as applicable to a transformer.
- reasons for voltage variation in the output of a transformer.
- determine the voltage regulation of a transformer from voltage and percentage impedance values.
- percentage impedance as applied to transformers.
- determine the percent impedance by using test results.
- determine percent impedance of a transformer by calculation.

T5 Parallel operation of transformers and transformer auxiliary equipment encompassing:

- determine polarity markings for an unidentified single phase double wound transformer.
- need for parallel operation of transformers.
- conditions/restrictions required before two transformers can be connected in parallel.
- connecting transformers in parallel to supply a single load (loading on transformers operating in parallel).
- the consequences/effect of an incorrect connection.

T6 Auto-transformers and instrument transformers encompassing:

- identification of auto-transformers, voltage transformers and current transformers from their winding diagrams.
- determining voltage and current in the windings of an auto-transformer by calculation.
- advantages and disadvantages of an auto-transformer.
- AS/NZS3000 requirements with respect to transformers.
- construction of voltage transformers.
- ratings of voltage transformers.
- construction of current transformers.
- ratings of current transformers.
- precautionary measures taken to connect and disconnect instrument transformers.
- connection diagrams for instrument transformers.
- applications for auto-transformers and instrument transformers.

KS02-EG006A Alternating current rotating machines

REQUIRED SKILLS AND KNOWLEDGE

Evidence shall show an understanding of alternating current rotating machines to an extent indicated by the following aspects:

T1 Operating Principles of three phase induction motors encompassing:

- determining circuit operating characteristics by using the right hand (grip) rule for conductors and solenoids and Fleming's left and right hand rules.
- characteristics of the magnetic field produced by a single, two and three-phase windings.
- speed of rotation of a rotating magnetic field.
- relationship between the rotor speed, slip and rotor frequency.
- basic principle of operation of an induction motor.
- reversing the direction of rotation of a three phase induction motor

T2 Three phase induction motor construction encompassing:

- basic component parts of a three-phase induction motor.
- types of rotors used in three-phase induction motors.
- connecting three-phase induction motor in both star and delta.
- dismantling three-phase induction motors.
- testing insulation resistance of a three-phase induction motor prior to connection to the supply.
- testing winding resistance (ohmic value and continuity) of a three-phase induction motor prior to connection to the supply

T3 Three phase induction motor characteristics encompassing:

- relationship between torque, speed, and power and interpretation of speed/torque curves of induction motors.
- squirrel cage motors operating characteristics conditions necessary for an induction motor to produce maximum torque.
- operating characteristics of an induction motor from name plate information and by measurement.
- induction motors efficiency and minimum energy performance standards (MEPS).
- full load efficiency and power factor of induction motors.

T4 Single phase motors – split phase encompassing:

- common types of single phase motor.
- principles of operation of a split phase induction motor.
- construction and basic characteristics of a split phase induction motor.
- applications of split phase induction motors.
- connecting, running and reversing a split phase induction motor.

T5 Single phase motors – capacitor and shaded pole types encompassing:

- identification of single phase induction motors including capacitor start, capacitor start/capacitor run, permanent split capacitor (PSC) and shaded pole
- principles of operation of each motor type listed above.

REQUIRED SKILLS AND KNOWLEDGE

- operating characteristics and typical applications of each motor type listed above.
- connection and running each type of motor listed.
- reversing the direction of rotation of each of the capacitor type motors.

T6 Single phase motors – universal encompassing:

- principles of operation of a series universal motor.
- identification and functions of each of the basic parts of a series universal motor.
- operating characteristics and typical uses for a series universal motor.
- connecting, running and reversing a series universal motor.

T7 Motor protection encompassing:

- reasons why motor protection is required.
- requirements of the AS/NZS3000 Wiring rules with regards to motor protection.
- types of motor overload protection.
- operating principles of microtherm devices, thermal and magnetic motor protection devices.
- electrical features of motor protection HRC fuses.
- effects of under voltage and over voltage on motors and motor circuits.
- effects of repetitive starting and/or reversing on motors.
- special requirements for motor protection, in high humidity or moist environments, high temperature areas and corrosive atmospheres.
- operating principles of phase failure protection.
- selecting suitable protective devices for a given motor and starter combination.

T8 Three phase synchronous machines- operation principles and construction encompassing:

- power transfer diagram of an a.c. synchronous machine.
- need for the generation of a sinusoidal waveform.
- principles of operation of a synchronous alternator.
- principles of operation of a synchronous motor.
- principles of operation of an asynchronous generator (induction generator).
- identification of main parts of a synchronous alternator/motor.
- methods used to provide the excitation of a synchronous alternator/motor.
- block diagram of an alternator voltage regulator.
- advantages gained by the parallel operation of alternators.
- starting methods of synchronous motors.

T9 Alternators and generators encompassing:

- effects on the generated voltage of variations in excitation.
- effects on generated voltage of variations in load.
- identification of characteristic curves of an alternator.
- types of prime movers used with single and three phase portable/standby alternators.
- manual operation of single and three phase portable/standby alternators.

REQUIRED SKILLS AND KNOWLEDGE

- ratings of single and three phase portable/standby alternators.
- applications of single and three phase portable/standby alternators.
- construction details of single and three phase portable/standby alternators.
- common faults found in portable/standby alternators.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and

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operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in single and three phase low voltage machines as described as described in 8) and including:

    A Determining the operating parameters of existing machines.

    B Altering an existing machine to comply with specified operating parameters.

    C Developing machines/circuits to comply with a

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specified function and operating parameters.

D Determining the cause of low efficiency in an existing machine.

E Determining conditions causing an existing circuit to be unsafe.

F Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in single and three phase low voltage machines.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE001B and other discipline specific occupational health

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and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any four of the following problems in single and three-phase low voltage machine and circuits.

- Determining the operating parameters of existing machines
- Altering an existing machine circuit to comply with specified operating parameters
- Developing machine circuits to comply with a specified function and operating parameters

Note:
Operating parameters include voltage, current, torque, efficiency, power, energy and power factor

- Determining the cause of low efficiency in an existing machine.
- Determining problems in existing machines to malfunction

Note:
Problems include bearing noise/faults, vibration, undervoltage, unbalanced windings

- Determining conditions causing an existing machine/circuit to be unsafe.

Note:
Examples of unsafe circuits includes electric shock hazard from indirect contract with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers ascertaining correct operation of single and three phase low voltage electrical apparatus and circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions. It encompasses safe working practices, apparatus circuit arrangements, issues related to operation, characteristics and protection and solutions to apparatus/circuit problems derived from calculated and measured parameters.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to solve single and three phase low voltage electrical apparatus/ circuit problems.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4	The nature of the apparatus/circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.

ELEMENT	PERFORMANCE CRITERIA	
	1.6	Sources of materials that may be required for the work are established in accordance with established procedures.
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve single and three phase low voltage electrical apparatus/circuit problems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Apparatus/circuits/plant is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Established methods are used to solve apparatus/circuit problems from measure and calculated values as they apply to single and three-phase low voltage apparatus/circuit.
	2.5	Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
	2.6	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.7	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve apparatus/circuit problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with

ELEMENT **PERFORMANCE CRITERIA**

established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in single and three phase low voltage electrical apparatus and circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG033A **Electrical apparatus and circuits**

Evidence shall show an understanding of electrical apparatus and circuits to an extent indicated by the following aspects:

T1 Lighting circuits – looping at the light/switch encompassing:

- the "loop at the light" method of wiring lighting circuits.
- the "loop at the switch" method of wiring lighting circuits
- wiring diagrams for the lighting circuit of an installation that incorporates one-way, two-way and two-way and intermediate switching of light points using the loop at the light/switch methods of TPS wiring.
- TPS cabling requirement for the loop at the light/switch circuit.
- installation methods of accessories and wiring for a lighting circuit incorporating one-way, two-way and two-way and intermediate switching of lighting points using the loop at the light/switch method of TPS wiring.
- correct operation of the install circuits including testing for correct compliance with Australian Standards.

T2 Circuits for socket outlets encompassing:

- the purpose of socket outlets.
- requirements concerning the polarity of switched socket outlets.
- correct cable size to supply 10 A, 15 A and 20 A socket outlets (single and three phase), for given installation conditions.
- number of socket outlets connected to a 16 A and 20 A circuit breaker.
- installation methods of a single phase socket outlet circuits.
- correct operation of the installed circuits including testing (dead testing only) for correct compliance with Australian Standards.

T3 Final sub-circuits and segregation encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- purpose of mixed circuits.
- circuit loading for a mixed circuit.
- purpose of segregation of circuits and the AS/NZS3000 requirements.
- Installation methods a single phase mixed circuits.
- correct operation of the installed circuits including testing for correct compliance with Australian Standards.

T4 Electrical heating control devices encompassing:

- methods of manual heat control.
- methods of automatic heat control.
- types and application for common thermostats.
- operation of common thermostats.
- sensitivity and differential of thermostats.
- testing of a thermostat (including differential and correct operation)
- applications of simmerstats (infinite controls).
- operation of a simmerstat.
- electronic heat control (phase control and zero voltage switching).

T5 Fixed electrical heating appliances encompassing:

- Terms: heat energy, temperature, specific heat capacity, thermal conductivity and thermal stability.
- determining the heat energy in joules and kWh in a simple heating process.
- methods of heat transfer.
- Determining the heat energy input and output of a heating process.
- connections to a two phase stove.
- operation of reverse cycle air conditioning.

T6 Electrical water heater operation encompassing:

- types of water heaters (instantaneous and storage) and their methods of control.
- intrinsic safety (pressure relief and thermal cut-out).
- testing of over temperature cut-out point of a thermostat.
- switchboard requirements to supply a controlled load water heater.
- internal circuit of a twin element water heater, and supply connections.
- tariffs employed by local supply authorities.
- solar heating system and its integration into an installation.

T7 Alternative supplies encompassing:

- reasons for the installation of alternative supplies.
- types of alternative supply systems.
- characteristics and operation of UPSs.
- Australian Standards and local requirements for safety services supply systems.

T8 Installation of batteries encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- common types of primary cells and secondary batteries and typical applications.
- terminal voltage of common primary cells and secondary cells.
- correct storage, handling and disposal techniques for cells and batteries.
- charge/discharge cycle for a secondary cell.
- effect of internal resistance on a secondary cell.
- state of charge of a secondary cell.
- installation of batteries as per AS/NZS3011
- commissioning procedures for various secondary batteries.
- safe working procedures when working with secondary cells and batteries.

T9 Fire protection – residential fire and smoke alarms encompassing:

- types of fire and smoke alarms.
- regulations and standards requirements regarding residential fire and smoke alarms.
- locations for residential fire and smoke alarms.
- wiring methods for residential fire and smoke alarms.
- operation of typical residential fire and smoke alarms

T10 Emergency and evacuation lighting and lighting control encompassing:

- factors and requirements of emergency and evacuation lighting concerning illumination levels, luminaire positioning and operating period.
- characteristics of maintained, non maintained and sustained emergency lighting systems.
- arrangement of batteries in point and central bank emergency lighting supply systems.
- lighting control methods

T11 Lighting concepts and incandescent lighting encompassing:

- basic concepts of lighting.
- terminology, principles and standards relevant to lighting (energy efficiency as per BCA new lamp types and permitted replacements and their efficacy)..
- basic types of luminaries.
- operation of an incandescent lamp.
- types of incandescent lamps.
- expected lamp life, colour rendering and efficacy for typical incandescent lamps.
- lighting layout in terms of visual comfort and relevant Australian standards

T12 Fluorescent low intensity discharge lighting encompassing:

- types of low intensity discharge lamps.
- expected lamp life, colour rendering and efficacy for typical types of low intensity discharge lamps.
- operation of low intensity discharge luminaires including their control equipment.
- Australian Standard and local requirements for low intensity discharge lighting.
- methods for satisfying Australian Standards and local supply authority requirements

REQUIRED SKILLS AND KNOWLEDGE

regarding low intensity discharge lighting.

T13 High intensity discharge lighting encompassing:

- types of high intensity discharge lamps.
- expected lamp life, colour rendering and efficacy for typical types of high intensity discharge lamps.
- operation of high intensity discharge luminaires including their control equipment.
- Australian Standard and local requirements for high intensity discharge lighting.
- methods for satisfying Australian Standards and local supply authority requirements regarding high intensity discharge lighting.
- LED lighting and its applications.
- Neon, Argon and Xenon lighting and their applications.
- comparison of incandescent, low intensity discharge, high intensity discharge, LED and other types of lighting

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the

EVIDENCE GUIDE

most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment

EVIDENCE GUIDE

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in single and three phase low voltage electrical apparatus and circuits as described as described in 8) and including:

A Determining the operating parameters of existing apparatus/circuits.

B Altering an existing apparatus/circuit to comply with specified operating parameters.

C Developing apparatus/circuits to comply with a specified function and operating parameters.

D Determining the cause of low efficiency in an existing apparatus/circuit.

E Determining conditions causing an existing apparatus/circuit to be unsafe.

F Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in electromagnetic circuits.

EVIDENCE GUIDE

Method of assessment	**9.4**) This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5**) There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any four types of problems for both single and three-phase apparatus and circuits and three types of circuit/equipment as listed below.

Type of problems

- Determining the operating parameters of existing apparatus/circuit
- Altering an existing apparatus/circuit to comply with specified operating parameters
- Developing apparatus/circuits to comply with a specified function and operating parameters

Note:
Operating parameters include voltage, current, efficiency, power, energy and power factor

- Determining the cause of low efficiency in an existing apparatus/circuit.
- Determining conditions causing an existing apparatus/circuit to be unsafe.

RANGE STATEMENT

	Note: Examples of unsafe circuits includes electric shock hazard from indirect contract with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection
Types of circuits/equipment	• Lighting circuits • Power circuits • Rotating machines • Electrical heating • Lighting

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

UEENEEG063A Arrange circuits, control and protection for general electrical installations

Modification History

Release	Action	Core/Elective	Details	Points
3	Edit		Adjust Performance Criteria numbering that was previously missing	

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the arrangement and termination of circuits, control and protection devices and systems for electrical installations operating at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompass knowledge and application of schemes for protection of persons and property, correct functioning, ensuring compatibility with the supply, arranging installation into circuits and selecting and arranging switchgear/controlgear and protective devices to meet compliance requirements and documenting arrangement decisions.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

1.2) License to practice

Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:
1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnolgy equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit

Prerequisite Unit(s) **2)**

UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to arrange electrical installations circuits, control and protection	1.1 The extent and nature of the electrical installation is determined from job specifications.
	1.2 Safety and other regulatory requirements to which the electrical installation shall comply are identified, obtained and understood.
	1.3 Load requirements for individual current-using equipment is determined from job specifications or from consultation with appropriate persons.
2 Arrange electrical installations circuits, control and protection	2.1 Circuits, control and protective devices are arranged to ensure safe and functional operation of the installation and to comply with technical standards and job specifications and requirements.
	2.2 Earthing is arranged and terminated to comply with the MEN system requirements.
	2.3 Protective devices are selected to meet the required switching and tripping currents, co-ordination and discrimination for overload and short-circuit protection.
	2.4 Residual current devices are selected to meet the required circuit, switching and tripping currents required.
	2.5 Switchgear/control gear is selected to meet current, voltage and IP ratings and functional requirements.
	2.6 Switchboards are arranged to accommodate control and protective devices, links, safety services, and other distributor equipment in accordance with requirements.
3 Document electrical installation circuits, control and protection arrangements	3.1 Evidence is obtained from manufacturers/suppliers that electrical equipment selected complies with safety requirements.
	3.2 Reasons for selections made, including calculations, are documented in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
	3.3 Electrical installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of arranging electrical installations circuits, control and protection.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG063A Electrical installations — arrangement, control and protection

Evidence shall show an understanding of circuit arrangements, control and protection of electrical installations that comply with the Wiring Rules and Service Rules to an extent indicated by the following aspects:

T1 Safety principles to which electrical systems in building and premises shall comply.

- Safety principles are given in Part1 (Section 1) of the Wiring Rules AS/NZS 3000 with deemed-to-comply requirements given in Sections 2 to 8.
- Compliant methods for providing protection - include those for providing protection against direct and indirect contact; thermal effects; unwanted voltages; overcurrent; fault currents; overload; overvoltage; injury from mechanical movement.
- Requirements for installation design and selection of equipment - includes compliant protection arrangements; correct functioning; compatibility with supply; estimation of maximum demands; voltage drop considerations; arrangement of circuits and the like

T2 Circuit and control arrangements encompassing:

- reason for dividing electrical installations into circuits
- factors that shall be considered in determining the number and type of circuits required for an installation.
- daily and seasonal demand for lighting power, heating and other loads in a given installation.

REQUIRED SKILLS AND KNOWLEDGE

- number and types of circuits required for a particular installation.
- diagrams/schedules of circuits for given installations.
- application and arrangements of SELV and PELV circuits
- application and arrangement of an isolated supply

T3 Hazards and risks in an electrical installation encompassing:

- effects on the human body of various levels of a.c. and d.c. current and duration of current flow for various current paths.
- risk of ignition of flammable materials due the thermal effects of current or electric arcs in normal service of an electrical installation.
- risk of injury from mechanical movement of electrically actuated equipment.
- Protection against direct contact (basic protection)
- acceptable methods
- use of extra-low voltage

T4 Protection against indirect contact encompassing:

- indirect contact with live parts of an electrical installation may occur.
- methods and devices that comply with the Wiring Rules for providing protection against indirect contact.
- components of the 'automatic disconnection of supply' method of protection against indirect contact.
- the terms ‘touch voltage’ and ‘touch current’.
- the current path when a short circuit fault to exposed conductive parts of an appliance occurs.
- protection against indirect contact is by the use of Class II equipment and by electrical separation.
- additional protection by use of Residual Current Devices (RCDs)
- protection against indirect contact by use of extra-low voltage and electrical separation.
- Protection requirements for damp situations.

T5 Earthing encompassing:

- the terms: earthed, earthed situation, earth electrode, equipotential bonding, multiple earthed neutral (MEN) system, protective earth-neutral (PEN) conductor, main earthing conductor, protective earthing (PE) conductor, functional earthing, MEN link.
- selection of minimum size-earthing conductor for a range of active conductor sizes and materials.
- parts of an earthing system and the purpose of each.
- typical arrangement for a MEN earthing system.
- arrangements of protective earthing conductors that comply with the Wiring Rules.
- requirements for equipotential bonding in a range of installation situations.
- Installation of a MEN earthing system for a single phase installation

REQUIRED SKILLS AND KNOWLEDGE

T6 Protection against overload and short circuit current encompassing:

- overload current or fault currents in an electrical installation.
- equivalent circuit of an earth fault-loop
- level of fault current possible at a given point in an installation from the fault-loop impedance and data from the electricity distributor.
- methods and devices that comply with the Wiring Rules AS/NZS 3000 for providing protection against the damaging effects of overload and fault current
- requirements for co-ordination between protective devices and conductors
- requirements for co-ordination of protection devices for discrimination and back-up protection.

T7 Devices for automatic disconnection of supply encompassing:

- operating principles of thermal/magnet circuit breakers.
- operating principles of common types of fuses.
- operating principles of residual current devices (RCD).
- time/current curves tripping characteristics of various types of circuit breakers that comply with the requirements of the Wiring Rules.
- time/current curves fusing characteristics of various types of fuses that comply with the requirements of the Wiring Rules.
- time/current curves tripping characteristics of various types of RCDs that comply with the requirements of the Wiring Rules.
- factors in a fault loop that will affect the impedance of the circuit.
- maximum impedance of an earth fault-loop to ensure operating of a protection device.
- selecting a fuse for fault current limiting protection.
- drawing switchboard wiring arrangements of 2-pole RCDs, 4-pole RCDs, combination RCD/MCBs.

T8 Protection against over voltage and under voltage encompassing:

- causes of over voltage and how this may affect the electrical system.
- methods for protection against over voltage.
- causes of under voltage and how this may affect the electrical system.
- methods for protection against under voltage.

T9 Control of an electrical installation and circuits encompassing:

- switch types, current and voltage ratings and IP rating and where these apply.
- switching requirements for isolation, emergency, mechanical maintenance and functional control.
- control arrangement for complete installations with and without safety services and an alternative supply.

T10 Switchboards / distribution boards encompassing:

- Purpose, types and applications.

REQUIRED SKILLS AND KNOWLEDGE

- Physical and circuit arrangements for whole current and CT metering.
- Physical and circuit arrangements of main switches, circuit protection devices, fault-current limiters and metering equipment and other distributor equipment.
- compliance requirements (includes location and access, arc fault protection, identification, construction suitability, equipment marking, wiring, fire protection and arc-fault protection).

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

EVIDENCE GUIDE

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - arranging electrical installations circuits, control and protection as described as described in 8) and including:

    A Determining the extent and nature of the installation for

EVIDENCE GUIDE

job specifications

B Obtaining and understand the safety and other regulatory requirements to which the electrical installation shall comply

C Determining individual load requirements.

D Arranging and terminate circuits, control and protective devices to comply with all requirements

E Selecting circuit protective devices residual current device that comply with all requirements.

F Selecting switchgear and control gear that meet current, voltage and IP ratings and functional requirements.

G Obtaining evidence of compliance for the equipment selected

H Documenting installation arrangement, specification for items selected and reasons for the selections made.

I Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to arranging circuits, control and protection for general electrical installations.

Method of

9.4)

EVIDENCE GUIDE

assessment	This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5**) For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit: UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to arranging of circuits, control and protection for at least two general electrical installations comprising a main switchboard, supplying more than one circuit each for, lighting, socket outlets, and fixed appliances. One of the installations shall include a distribution board separate from the main switchboard and at least one circuit supplying a three-phase load and a fire pump.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.2) Literacy and numeracy skills

Competency Field **5**)

Electrical

UEENEEG076A Install and replace low voltage current transformer metering

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the installation and/or replacement of low voltage CT metering for measurement of energy use by consumers under choice of supplier arrangement. It encompasses working safely and to installation and set up standards, evaluating the integrity of metering wiring and earthing systems, fixing metering, making power and communication connections, setting meter parameters and completing the necessary documentation.

Application of the Unit

Application of the Unit **4)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a license to practice in the workplace subject to regulations for undertaking of electrical work.

Practice in workplace and during training is also subject to regulations directly related

1.2) License to practice

to occupational health and safety and where applicable, contracts of training such as apprenticeships.

Note.
Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG105A and all prerequisite units it specifies

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Note: Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory meet the pre-requisite requirements of this unit.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work

Prerequisite Unit(s) **2)**

UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability

Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install or replace CT energy metering.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented. (Note 1: Examples of hazards likely to be encountered are asbestos reinforced switchboard panels, deteriorating switchgear and cabling and location of the switchboard.)
	1.4 Switchboard on which the meter(s)/CTs is/are to be installed is inspected and evaluated for compliance with safety and functionality standards. (Note 2: Safety and functionality standards include the clear identification of switchboard components and their function, sound electrical insulation of wiring and components, sound MEN and main earth connections, fire integrity and access.)
	1.5 Approval to rectify safety and/or functionality defects of the switchboard is sought from person of higher authority in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA	
	1.6	Installation of the meter and rectification work is prepared in consultation with others affected by the work and sequenced appropriately.
	1.7	Material needed for the work is obtained in accordance with established procedures and checked against job requirements.
	1.8	Tools, equipment and testing devices needed to for the work are obtained in accordance with established procedures and checked for correct operation and safety.
2 Install or replace CT metering.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Existing metering is checked as being isolated in strict accordance OHS requirements and procedures.
	2.4	Approved rectification work is carried out to comply with standards and in accordance with established procedures.
	2.5	Meters and CTs are installed/replaced to comply with technical standards and job specifications and requirements.
	2.6	Metering power and communication connections (where necessary) are made in accordance with manufacturer's specifications and functional and regulatory requirements.
	2.7	Meter operating parameters are set in accordance with manufacturer's specifications and functional and regulatory requirements.
	2.8	Unexpected situations are dealt with safely and with the approval of an authorised person
	2.9	Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.
	2.10	Metering/CT installation is carried out efficiently without unnecessary waste of materials or damage to apparatus,

ELEMENT	PERFORMANCE CRITERIA	
		circuits, the surrounding environment or services and using sustainable energy principles.
3 Complete and report metering installation activities.	3.1	OHS work completion risk control measures and procedures are followed and supply is reinstated to the installation.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Final checks are made to that the installed metering and CTs conform to requirements.
	3.4	'As-installed' metering and CTs and rectification work is documented and appropriate persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and setting up interval metering.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG076A Low voltage current transformer metering

Evidence shall show an understanding of low voltage current transformer metering to an extent indicated by the following aspects:

T1 Current Transformers (CTs) encompassing:

- uses and functions
- AS60044.1-2007 requirements
- characteristics and saturation
- differences between metering and protection CTs
- standard ratios and outputs
- accurate range of loading
- thermal current limit

REQUIRED SKILLS AND KNOWLEDGE

- burden and connecting cable length
- short circuiting secondary as a safety issue
- accuracy class

T2 Revenue meter types used with CTs encompassing:

T3 CT installations encompassing:

- uses in the regulated market and relevant regulations
- types and mounting methods
- switchboard layouts (various Distributors)
- minimum spacing of CTs
- connections to single and polyphase revenue meters
- consequence of polarity reversal in one phase of a polyphase meter

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1**)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the

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critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install /replace low voltage CT metering as described in 8) and including:

EVIDENCE GUIDE

A Inspecting and evaluating safety and functionality compliance of the switchboard accurately.

B Following established procedures to obtain approval to rectify non-compliance aspects of the switchboard.

C Carrying out preparation work effectively.

D Rectifying compliance defects.

E Placing and securing metering correctly.

F Making power and communications connections in accordance with manufacture's specifications and functional and regulatory requirements.

G Setting meter parameters in accordance with manufacture's specifications and functional and regulatory requirements.

H Reinstating supply to the installation safely.

I Documenting CT metering and rectification work and notifying appropriate persons in accordance with established procedures.

J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry

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simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing and setting up interval metering.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the installation of at least a:

- low voltage CT installation using single phase meters
- low voltage CT installation using a polyphase meter
- metering installation where compliance rectification work is required

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

UEENEEG101A Solve problems in electromagnetic devices and related circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers determining correct operation of electromagnetic devices and related circuits and providing solutions as they apply to electrical installations and equipment. It encompasses working safely, power circuit problems solving processes, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in electromagnetic devices and related circuits.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to work on electromagnetic devices and circuits.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	OHS risk control work preparation measures and procedures are followed.
	1.3	The nature of the device(s)/circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5	Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve electromagnetic devices/circuit problems.	2.1	OHS risk control work measures and procedures are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Established methods are used to solving circuit problems from measure and calculated values as they apply to electromagnetic devices/circuits.

ELEMENT	PERFORMANCE CRITERIA	
	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in electromagnetic devices and related circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG101A Electromagnetic devices and circuits

Evidence shall show an understanding of electromagnetic devices and circuits to an extent indicated by the following aspects:

T1 Magnetism encompassing:

- magnetic field pattern of bar and horse-shoe magnets.
- magnets attraction and repulsion when brought in contact with each other.
- common magnetic and non-magnetic materials and groupings (diamagnetic, paramagnetic and ferromagnetic materials).
- principle of magnetic screening (shielding) and its applications.
- practical applications of magnets

REQUIRED SKILLS AND KNOWLEDGE

- construction, operation and applications of reed switches.

T2 Electromagnetism encompassing:

- conventions representing direction of current flow in a conductor.
- magnetic field pattern around a single conductor and two adjacent conductors carrying current.
- Using the "right hand rule" to determine the direction of magnetic field around a current carrying conductor.
- direction of force between adjacent current carrying conductors.
- effect of current, length and distance apart on the force between conductors (including forces on bus bars during fault conditions).
- magnetic field around an electromagnet.
- Using the "right hand rule" to determine the direction of magnetic field around a current carrying coil.
- magnetomotive force (m.m.f.) and its relationship to the number of turns in a coil and the current flowing in the coil.
- practical applications of electromagnets.

T3 Magnetic circuits encompassing:

- magnetic characteristic curve for various materials and identify the various regions.
- Identify the various conditions of a magnetic material from its Hysteresis loop.
- factors which determine losses in magnetic material.
- methods used to reduce electrical losses in a magnetic circuit.
- magnetic flux (definition, unit and symbol).
- reluctance as the opposition to the establishment of magnetic flux.
- permeability (definition, symbol and unit).
- difference for magnetic and non-magnetic materials in regards to reluctance and permeability.
- calculation of m.m.f., flux or reluctance given any two values.
- flux density (definition, symbol, unit and calculation).
- magnetising force (definition, symbol, unit and calculation).
- common magnetic circuit types.
- effect of an air gap in a magnetic circuit.
- terms "magnetic leakage" and "magnetic fringing".

T4 Electromagnetic induction encompassing:

- principle of electromagnetic induction (Faraday's law of electromagnetic induction).
- applying "Fleming's right hand rule" to a current a carrying conductor under the influence of a magnetic field.
- calculation of induced e.m.f. in a conductor given the conductor length, flux density and velocity of the conductor.
- calculation of induced e.m.f. in a coil given the number of turns in a coil and the rate of change of flux.

REQUIRED SKILLS AND KNOWLEDGE

- calculation of force on a conductor given the flux density of the magnetic field, length of the conductor and the current being carried by the conductor.
- Lenz's law
- applications of electromagnetic induction

T5 Inductance encompassing:

- construction of an inductor, including a bifilar winding inductor.
- Australian Standard circuit diagram symbol for the four types of inductor.
- effect of physical parameters on the inductance of an inductor.
- common types of inductor cores.
- applications of the different types of inductors.
- definition of terms self induction, inductance and mutual inductance.
- calculation of value of self induced e.m.f. in a coil.
- mutual induction occurs between two coils.
- graphical relationship between load voltage, current and self induced e.m.f. in a single d.c. circuit having inductance.
- practical applications for the effects of self and mutual induction.
- undesirable effects of self and mutual induction.
- definition of term "time constant" and draw the characteristic curve as applied to a series circuit containing an inductor and a resistor. (LR circuit)Calculation of value of the time constant for an LR circuit given the values of the components.
- time constants required for the current in an LR circuit to reach its final value.
- determining of instantaneous values of voltage and current in an LR circuit using a universal time constant chart.

T6 Measurement Instruments encompassing:

- moving coil, moving iron, dynamometer meter movements and clamp testers.
- practical applications for moving coil, moving iron and dynamometer meter movements.
- Calculation of resistance of shunts and multipliers to extend the range of ammeters and voltmeters.
- factors to be considered in selecting meters for a particular application.
- safety category of meters and their associated applications.
- steps and procedures for the safe use, care and storage of electrical instruments.

T7 Magnetic devices encompassing:

- construction, operation and applications of relays.
- construction, operation and applications of contactors.
- magnetic methods used to extinguish the arc between opening contacts.
- construction, operation and applications of Hall Effect devices.
- operation and applications of magnetostriction equipment.
- construction, operation and application of magnetic sensing devices.

REQUIRED SKILLS AND KNOWLEDGE

T8 Machine principles encompassing:

- basic operating principle of a generator.
- applying Fleming's right hand rule for generators.
- basic operating principle of a motor.
- applying Fleming's left hand rule for motors.
- calculation of force and torque developed by a motor.

T9 Rotating machine construction, testing and maintenance encompassing:

- components of a d.c. machine.
- difference between a generator and a motor in terms of energy conversion.
- nameplate of a machine.
- using electrical equipment to make electrical measurements and comparison of readings with nameplate ratings.
- Identification of faults in a machine from electrical measurements.
- care and maintenance processes for rotating machines
- safety risks associated with using rotating machinery.

T10 Generators encompassing:

- basic operation of a d.c generator.
- calculation of generated and terminal voltage of a d.c. shunt generator
- prime movers, energy sources and energy flow used to generate electricity.
- types of d.c. generators and their applications.
- methods of excitation used for d.c generators.
- equivalent circuit for a d.c. generator.
- importance of residual magnetism for a self excited generator.
- open circuit characteristics of d.c. generators.
- load characteristics of a d.c generator.
- reversing the polarity of a d.c. generator
- Connect and test a d.c generator on no-load and load
- Identify safety risks associated with using generators.

T11 Motors encompassing:

- operation of a motor and its energy flow.
- effect of back e.m.f. in d.c. motors
- torque as the product of the force on the conductors and the radius of the armature/rotor.
- types of d.c. motors and their applications.
- circuit diagrams for the types of d.c. motors.
- equivalent circuit for the types of d.c. motors.
- calculation of power output of a motor.
- characteristics of the different types of d.c. motors.
- connection and testing a d.c. shunt motor on no-load and load

REQUIRED SKILLS AND KNOWLEDGE

- reversing the direction of rotation of a d.c. motor.
- safety risks associated with using motors (include risks of series d.c. motors).

T12 Machine efficiency encompassing:

- losses that occur in a d.c machine.
- methods used to determine the losses in a d.c. machine.
- calculation of losses and efficiency of a d.c machine.
- efficiency characteristic of a d.c. machine and the conditions for maximum efficiency.
- application of Minimum Energy Performance standards (MEPS).
- methods used to maintain high efficiency.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

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The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:

EVIDENCE GUIDE

- Solve problems in electromagnetic circuits as described as described in 8) and including:

A Using methodological techniques to solve problems in circuits with an electromagnetic device from measure and calculated values

B Determining the operating parameters of an existing circuit with an electromagnetic device.

C Alternating an existing circuit with an electromagnetic device to comply with specified operating parameters.

D Developing circuits with electromagnetic devices to comply with a specified function and operating parameters.

E Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in electromagnetic devices and related circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires

EVIDENCE GUIDE

	assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5**) For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving problems in electromagnetic devices and related circuits by:

- Determining the operating parameters of an existing circuits with electromagnetic devices
- Altering an existing circuit with an electromagnetic device to comply with specified operating parameters
- Developing circuit with an electromagnetic device to comply with a specified function and operating parameters

AND

In relation to the following on more than one occasions:

Solving problems

- Connecting circuits,
- Using methodological problem solving techniques,
- Solving electromagnetic device problems,
- Demonstrate an understanding of the behaviour of current and voltage in circuits with electromagnetic devices
- Calculating circuit parameters accurately,

Circuit and device testing

- Choose correct instruments and ranges for testing,
- Connect meters to measure parameters in circuits with

RANGE STATEMENT

electromagnetic devices,

and

At least four of the following electromagnetic devices

- Reed switches
- Solenoids
- Relays
- Contactors
- Inductive limit switches
- Bells
- Lifting magnets
- Core balance devices
- Magnetic overloads
- Motors
- Generators
- Magnetic brakes
- Magnetic circuit breakers

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

UEENEEG102A Solve problems in low voltage a.c. circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers ascertaining correct operation of single and three phase a.c. circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions. It encompasses safe working practices, multiphase circuit arrangements, issues related to protection, power factor and MEN systems and solutions to circuit problems derived from calculated and measured parameters.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c circuits
UEENEEG101A	Solve problems in electromagnetic devices and related circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to solve low voltage a.c. circuit problems.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4	The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.6	Sources of materials that may be required for the work are established in accordance with established procedures.
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve low voltage a.c. circuit problems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
\	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

ELEMENT	PERFORMANCE CRITERIA	
	2.4	Established methods are used to solve circuit problems from measure and calculated values as they apply to single and three-phase low voltage circuit.
	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and Solving single and three phase low voltage circuit problems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG102A Alternating current power circuits

Evidence shall show an understanding of alternating currents power circuits to an extent indicated by the following aspects:

T1 Alternating Current Quantities encompassing:

- sine, cosine and tangent ratios of a right angle triangle
- Pythagoras Theorem to a right angle triangle.
- use of the CRO to measure d.c. and a.c. voltage levels

REQUIRED SKILLS AND KNOWLEDGE

- sinusoidal voltage generated by a single turn coil rotated in a uniform magnetic fields
- terms 'period', 'maximum value', 'peak-to-peak value', 'instantaneous value', 'average value', 'root-mean-square (r.m.s.) value', in relation to a sinusoidal waveform.
- calculation of the instantaneous value of induced voltage of a generated sinusoidal waveform.
- measurement of instantaneous, peak, peak-to-peak values and the period of a sinusoidal waveform.
- calculation of root-mean-square (r.m.s.) value and frequency of a sinusoidal waveform from values of peak voltage and period.

T2 Phasors Diagrams encompassing:

- purpose of phasor diagrams
- 'in-phase', 'out-of-phase', 'phase angle'' lead' and 'lag'.
- phase angle between two or more alternating quantities from a given sinusoidal waveform diagram.
- convention for representing voltage, current and the reference quantity in a phasor diagram.
- drawing phasor diagrams to show the relationship between two or more a.c. values of voltage and/or current.
- determination of phase relationship between two or more sinusoidal waveforms from a given diagram and measurements.

T3 Single Element a.c. circuits encompassing:

- setting up and connect a single-source resistive a.c. circuit and take voltage and current measurements to determine the resistance
- determining the voltage, current resistances from measure of given values of any tow of these qualities.
- relationship between voltage drops and current in resistive a.c. circuit
- applications of resistive a.c. circuits
- defining ‘inductive reactance’.
- calculation of inductive reactance for a given inductor and the relationship between inductive reactance and frequency.
- applying Ohm’s Law to determine voltage, current of inductive reactance in a purely inductive a.c. circuit given any two to these quantities.
- applications of inductive a.c circuits.
- calculation of capacitive reactance
- applying Ohm’s Law to determine voltage, current or capacitive reactance in a purely capacitive a.c circuit given any two of the quantities.
- applications of capacitive a.c circuits

T4 RC and RL Series a.c. circuits encompassing:

- impedance and impedance triangle.
- determining the impedance, current and voltages for a series RC circuit given the resistance, capacitance and supply voltage.

REQUIRED SKILLS AND KNOWLEDGE

- drawing and labelling the impedance triangle for a series RC circuit
- drawing phasor diagrams for a series RC circuit
- AS/NZS 3000 requirements for the installation of capacitors.
- examples of capacitive components in power circuits and systems and the effect on the phase relationship between voltage and current.
- determining the impedance, current and voltages for a series RL circuit given the resistance, inductance and supply voltage.
- drawing and labelling the impedance triangle for a series RL circuit
- drawing the equivalent circuit of a practical inductor
- Draw phasor diagrams for a series RL circuit.
- examples of inductive components in power circuits and systems and describe their effect on the phase relationship between voltage and current

T5 RLC Series a.c. circuits encompassing:

- measuring component voltages in a series RLC circuit and using a phasor diagram to determine the supply voltage and phase angle between circuit voltage and circuit current.
- determining the impedance, current and voltages for a series RLC circuit given resistance, inductance, capacitance and supply voltage.
- drawing and labelling the impedance triangle for a series RLC circuit.
- calculation of total impedance for a series RLC circuit.
- calculation of voltage drop for cables using the values for reactance and a.c. resistance from AS/NZS 3008.
- comparison of current limiting characteristics of inductors and resistors.
- practical examples of RLC series circuits

T6 Parallel a.c. Circuits encompassing:

- determining the branch currents of a parallel circuit that contain RL, RC or LC in two branches.
- using a phasor diagram to determine the total circuit current and phase angle in parallel RL, RC or LC circuits.
- determining the total circuit impedance of parallel RL, RC or LC circuits.
- measuring the branch currents in a parallel RLC circuit and use a phasor diagram to determine the total current and phase angle between circuit voltage and circuit current.
- determining the branch impedances, branch currents and phase angles voltages for a parallel RLC circuit given resistance, inductance, capacitance and supply voltage.
- calculation of impedance for a parallel RLC circuit.
- practical examples of parallel circuits.

T7 Power in an a.c. circuit encompassing:

- difference between true power, apparent power and reactive power and the units in which these quantities are measured.
- drawing the power triangle to show the relationships between true power, apparent

REQUIRED SKILLS AND KNOWLEDGE

power and reactive power
- defining the term "power factor" and phase angle.
- methods used to measure single phase power, energy and demand.

T8 Power Factor Improvement encompassing:

- effects of low power factor.
- requirements for power factor improvement.
- methods used to improve low power factor of an installation.
- local supply authority and AS/NZS 3000 wiring rules requirements regarding the power factor of an installation and power factor improvement equipment.
- methods used to measure single phase power factor.
- using manufacturers catalogues to select power factor equipment for a particular installation

T9 Harmonics and Resonance Effect in a.c. Systems encompassing:

- term "harmonic" in relation to the sinusoidal waveform of an a.c. power system.
- sources in a.c. systems that produce harmonics.
- problems that may arise in a.c. circuits as a result of harmonics and how these are overcome.
- methods and test equipment used to test for harmonics
- methods used to reduce harmonics in a.c. power system
- conditions in a series a.c. circuit that produce resonance.
- dangers of series resonance circuits
- conditions in a parallel a.c. circuit that produce resonance.
- dangers of parallel resonance circuits
- AS/NZS3000 and the local supply authority requirements concerning harmonics and resonance effect in a.c. power systems.

T10 Three Phase Systems encompassing:

- features of a multiphase system.
- comparison of voltages generated by single and multiphase alternators.
- reasons for the adoption of three phases for power systems.
- how three phases is generated in a single alternator.
- Calculation of r.m.s. value of voltage generated in each phase given the maximum value.
- relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each.
- term "phase sequence" (also, referred to as "phase rotation").
- determining the phase sequence of a three phase supply

T11 Three phase star-connections encompassing:

- connecting a three phase star-connection load.
- phase relationship between line and phase voltages and line and phase currents of a

REQUIRED SKILLS AND KNOWLEDGE

star-connected system.
- determining the r.m.s. value of line and phase voltage given any one of these quantities.
- determining the r.m.s. value of line and phase current given any one of these quantities.
- terms "balanced load" and "unbalanced load".
- effect of a reversed phase winding of a star connected alternator.
- example of balanced and unbalanced loads in typical power systems.

T12 Three phase four wire systems encompassing:

- purpose of the neutral conductor in a three phase four wire systems.
- determining the effects of an high impedance in the neutral conductor of a three phase four wire system supplying an unbalanced load where MEN earthing is employed.
- determining the value and phase relationship of neutral current in an unbalanced three phase four wire systems given line currents and power factors.
- AS/NZS 3000 requirements regarding neutral conductors.
- AS/NZS 3008.1.1 method for determining voltage drop in unbalanced three phase circuits

T13 Three phase delta-connections and Interconnected systems encompassing:

- connecting three phase delta loads.
- phase relationship between line and phase voltages and line and phase currents of a delta-connected system.
- determining the r.m.s. value of line and phase voltage given any one of these quantities.
- determining the r.m.s. value of line and phase current given any one of these quantities.
- limitations and uses of open delta connections
- effect of a reversed phase winding of a delta connected transformer
- example of loads in typical power systems.
- drawing the typical combinations of three phase interconnected systems using star-connections and a delta-connection.
- relationship between line and phase voltages and line and phase currents in the typical interconnected systems using star-connections and delta-connections.

T14 Energy and power requirements of a.c. systems encompassing:

- purposes for measuring power, energy, power factor and maximum demand of a.c. power systems and loads.
- difference between true power, apparent power and reactive power and the units in which these quantities are measured in a three phase system.
- drawing the power triangle to show the relationships between true power, apparent power and reactive power in a three phase system.
- methods used to measure three phase power , energy, power factor and demand.
- determining how the power factor of a three phase installation can be improved.
- using manufacturers catalogues to select measurement equipment for a particular installation

T15 Fault Loop Impedance encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- term fault loop impedance of a a.c. power system
- determining fault loop impedance using resistance and reactance values from AS/NZS 3008.1.1
- measuring fault loop impedance of typical circuits
- procedures for testing fault loop impedance

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will

EVIDENCE GUIDE

contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in single and three phase circuits as described as described in 8) and including:

    A Using methodological techniques to solve problems in circuits in a.c. circuits from measure and calculated values

    B Determining the operating parameters of existing circuits

EVIDENCE GUIDE

C Altering an existing circuit to comply with specified operating parameters.

D Developing circuits to comply with a specified function and operating parameters.

E Determining the cause of low power factor in an existing circuit.

F Determining conditions causing an existing circuit to be unsafe.

G Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving single and three phase low voltage circuit problems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent

9.5)

EVIDENCE GUIDE

assessment and relationship with other units	For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving problems in a.c. circuit by:

- Determining the operating parameters of existing circuits
- Altering an existing circuit to comply with specified operating parameters
- Developing circuits to comply with a specified function and operating parameters of voltage, current, impedance, power and power factor
- Determining the cause of low power factor in an existing circuit.
- Determining conditions causing an existing circuit to be unsafe includes electric shock hazard from indirect contract with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection.

In relation to the following on more than one occasions:

Single phase circuits

- Connecting single-phase circuits
- Choosing correct instruments
- Taking measurements correctly and accurately.

Three-phase circuits

- Connecting three-phase circuits
- Choosing correct instruments
- Taking measurements correctly and accurately.

AND

At least four of the following applications

- Series a.c. circuits
- Parallel a.c. circuits

RANGE STATEMENT

- Series / parallel a.c. circuits
- Single phase motors / controls
- Three phase motors / controls
- Synchronous machines
- Transformers / Auxiliary components
- Star connected circuits
- Delta connected circuits
- Star-Delta interconnected circuits
- Open Delta circuits

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

Custom Content Section

Competency Field **5)**

Electrical

UEENEEG103A Install low voltage wiring and accessories

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers the installation in building and premises of wiring enclosures, cable support systems, cables and accessories and designed to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to installation standards, routing cables to specified locations, terminating cables and connecting wiring at accessories and completing the necessary installation documentation.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations

Prerequisite Unit(s) **2)**

UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install wiring and accessories.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
	1.4 Installation of wiring is prepared in consultation with other affected by the work and sequenced appropriately.
	1.5 The nature and location of the work is determined from documentation or other appropriate person to establish the scope of work to be undertaken.
	1.6 Cable routes are planned within the constraints of the building structure, significants and requirements.
	1.7 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
	1.8 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.
	1.9 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Install wiring and accessories.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

ELEMENT	PERFORMANCE CRITERIA	
	2.4	Wiring and accessories are installed to comply with technical standards and job specifications and requirements with sufficient excess to affect terminations.
	2.5	Accessories are installed straight and square in the required locations and within acceptable tolerances.
	2.6	Cables and conductors are terminated at accessories in accordance with manufacture's specifications and regulatory requirements.
	2.7	Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken.
	2.8	Defects revealed through on-going compliance and safety inspection and tests are rectified.
	2.9	Cable installation and termination is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
	2.10	Unexpected situations are dealt with safely and with the approval of an authorised person.
3 Completion and report installation activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	'As-installed' cables/wiring and accessories is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and

REQUIRED SKILLS AND KNOWLEDGE

installing wiring and accessories for low voltage circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices.

KS01-EG103A Installation of wiring systems

Evidence shall show an understanding of the installation of wiring systems that comply with standards to an extent indicated by the following aspects:

T1 Standards, codes and requirements applicable to the installation of wiring systems encompassing:

- Cables and methods of mechanical protection and support
- Protection against and from other services.
- Prohibited cable locations
- Building codes affecting the installation of cables in buildings, structures and premises (limitation on penetration of structural elements, maintenance of fire protection integrity, and wiring above suspected ceilings)
- Issues affecting electrical installations in heritage buildings and premises (limitation on penetration of structural and finished elements, accessing cable routes, types and colour of exposed accessories).

T2 Use of other installation standards called up by the Wiring Rules for special situations encompassing:

- standards that apply to Electromedical treatment areas.
- additional requirements for construction and demolition sites.
- Relocatable installations and their site supply
- additional requirements for caravan park.
- additional requirements for marinas and pleasure craft at low voltage.
- additional requirements for shows and carnivals.

T3 Hazardous areas encompassing:

- Conditions that apply in an areas that require them to be classified as a ‘Hazardous area’.
- Responsibility for classifying a hazardous area
- Awareness of standards called up by the Wiring Rules for selection of equipment and installations in Hazardous areas. (AS/NZS 3000 requirements for hazardous areas).

T4 Requirement for the installation of cables and accessories in damp situations and ELV installations encompassing:

- restricted zones around baths, showers, fixed water containers, pools, sauna heaters and fountains/water features for given installations.
- selecting equipment suitable for installation in given damp situations.
- voltage range that defines extra-low voltage.
- 'Separated extra-low voltage (SELV) system' and a 'Protected extra-low voltage (PELV) system''.

REQUIRED SKILLS AND KNOWLEDGE

- AS/NZS 3000 requirements for selecting extra-low voltage systems and devices for a range of installations and conditions.

T5 Aerial cabling encompassing:

- Describe the types of aerial cabling.
- State the AS/NZS 3000 and local supply authority requirements for aerial cabling.
- Termination of aerial cables in accordance with AS/NZS 3000 and local requirements.
- installation of consumers mains for connection via overhead consumers terminals in accordance with AS/NZS 3000 and local requirements.
- Testing of installed cables compliance with Australian Standards

T6 Underground cabling encompassing:

- Describe permissible underground cabling systems.
- Identify other underground services.
- State the AS/NZS 3000 and local supply authority requirements for underground cabling.
- List the advantages and disadvantages of underground wiring systems
- selection of underground consumers mains in accordance with AS/NZS 3000 and local requirements

T7 Techniques for installing cables and wiring systems encompassing:

- Typical cable routes through buildings, structures and premises.
- Application of wiring accessories
- Drawing-in, placing and fixing of cables
- Cable and conductor terminations
- Maintaining fire rating integrity.
- Inspecting and testing installed and terminated cables to ensure they comply with continuity and insulation resistance and are safe to connect to the supply.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of 9.1)

EVIDENCE GUIDE

Assessment

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install wiring and accessories for low voltage circuits as described as described in 8) and including:

    A Reading and interpreting drawings related to cable layouts, cable schedules and apparatus locations.

    B Planning cable routes and obtaining installation materials.

    C Sequencing the installation effectively with other affected by the work.

    D Routing, placing and securing cables in compliance with requirements.

    E Placing and securing accessories accurately.

    F Maintaining fire integrity.

    G Terminating cable and conductors to comply with requirements.

    H Undertaking on-going compliance and safety inspection and testing of installed circuits.

    I Rectifying any defects revealed through on-going inspection and testing

    J Correctly documenting 'as-installed' cables/wiring and

EVIDENCE GUIDE

accessories.

K Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing wiring and accessories for low voltage circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to at least three different types of cable enclosure/support systems in combination with four different cable types and circuits for five different purposes as listed below.

Wiring systems enclosures and supports:

- Metallic conduit
- Non-metallic conduit
- Trunking
- Duct
- Cable tray/ladder
- Catenary
- Posts/poles/struts

Cable types:

- Thermoplastic insulated cable (TPI)
- Flat thermoplastic sheathed (TPS)
- Circular thermoplastic sheathed (TPS)
- Steel wire armoured (SWA)
- Fire rated cable (HT or HF or MIMS)
- Flexible cables
- Aerial cable

Circuit purpose:

- Consumers mains
- Submains
- Alternative supply
- Lighting;
- Socket outlets
- Single phase fixed appliance
- Single phase motor
- Three phase motor
- Control

Generic terms used throughout this Vocational Standard shall be regarded as part of the

RANGE STATEMENT

Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the installation of appliances protection devices, switchgear, controlgear, switchboards, and accessories designed to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to installation standards, matching appliances and accessories with that specified, making required circuit connections and completing the necessary installation documentation.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations

Prerequisite Unit(s) **2)**

UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to install appliances, switchgear and associated accessories.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
	1.4	Installation is prepared in consultation with others affected by the work and sequenced appropriately.
	1.5	The nature and location of the work is determined from documentation or appropriate person to establish the scope of work to be undertaken.
	1.6	Locations of appliances, switchgear and accessories is planned within the constraints of the building structure, significants and requirements.
	1.7	Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
	1.8	Tools, equipment and testing devices needed to for

ELEMENT	PERFORMANCE CRITERIA	
		the installation work are obtained in accordance with established procedures and checked for correct operation and safety.
	1.9	Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Install appliances, switchgear and associated accessories.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Appliances, switchgear and accessories are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance.
	2.5	Accessories are installed straight and square in the required locations and within acceptable tolerances.
	2.6	Wiring is terminated at appliances, switchgear and accessories in accordance with manufacture's specifications and functional and regulatory requirements.
	2.7	Ongoing compliance and safety inspections of the installed appliances, switchgear and accessories is undertaken.
	2.8	Defects revealed through on-going compliance and safety inspection are rectified.
	2.9	Installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
	2.10	Unexpected situations are dealt with safely and with the approval of an authorised person.

ELEMENT	PERFORMANCE CRITERIA
3 Completion and report installation activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.4 'As-installed' appliances, switchgear and accessories is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing low voltage electrical appliance, switchgear and accessories.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices

KS01-EG104A Installation of appliances, switchgear and accessories

Evidence shall show an understanding of the installation of appliances (current-using equipment) and accessories to an extent indicated by the following aspects:

T1 Installation standards, codes and requirements applicable to installing electrical equipment encompassing.

- Protection against thermal effects
- Connection of electrical equipment (appliances, switchgear and accessories include switchgear and controlgear, switchboards, socket-outlets, lighting equipment and accessories, lamps and luminaires, smoke and fire detectors, cooking appliances, appliances producing hot water or steam, room heaters, electric heating cables for floors and ceilings, space heating, duct heaters, electricity converters, motors, transformers, capacitors, and batteries).
- Required and permitted locations current-using equipment and accessories
- Control, switching and over current and RCD protection

T2 Terminal configuration for connection of phase, neutral and protective earthing conductors for each type of equipment.

T3 Building codes affecting the installation of current-using equipment and accessories in buildings, structures and premises encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- maintenance of fire protection integrity, requirements for emergency services (safety services) and the like.

T4 Issues affecting electrical installations in heritage buildings and premises encompassing:

- limitation on types and colour of exposed accessories.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to

EVIDENCE GUIDE

be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install low voltage electrical apparatus and associated equipment as described as described in 8) and including:

EVIDENCE GUIDE

A Reading and interpreting drawings related to and apparatus locations and circuit connections.

B Planning installation of appliances, switchgear and accessories and obtaining installation materials.

C Sequencing the installation effectively with other affected by the work.

D Placing and securing appliances, switchgear and accessories accurately in their planned location and in compliance with standards.

E Maintaining fire integrity.

F Terminating and connecting appliances, switchgear and accessories to comply with requirements.

G Undertaking on-going compliance and safety inspections

H Rectifying any defects revealed through on-going inspections

H Correctly documenting 'as-installed' appliances, switchgear and accessories.

I Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry

EVIDENCE GUIDE

practices in relation to installing low voltage electrical apparatus and associated equipment.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG103A Install low voltage wiring and accessories

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation and connection of appliances, switchgear and associated accessories as follows:

Each of the following

- Installing and connecting main switches, protective devices and links on a main switchboard and preparing the switchboard for the installation of metering
- Installing and connecting a custom switchboard;
- Socket-outlets;
- Lighting equipment and accessories;

RANGE STATEMENT

- Luminaires, and

At least four of the following

- Cooking appliances
- Smoke and fire detectors
- Water heaters and controls
- Three phase motor starter and control switches
- Fixed electric heating system (room heaters)
- Transformers
- Appliances producing hot water or steam
- Electric heating cables for floors and ceilings
- Trace heating
- Duct heaters
- Electricity converters
- Capacitors.
- Batteries.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

Custom Content Section

Competency Field **5)**

Electrical

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

Modification History

Release	Action	Core/Elective	Details	Points
3	Edit	N/A	Corrected text in Range Statement	

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers inspection and testing to verify whether an electrical installation is safe and complies with all requirements. It encompasses working safely, visual inspections and mandatory, optional and functional testing following verification procedures, identifying non-compliance defects and mandatory reporting requirements.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG103A	Install low voltage wiring and accessories

Prerequisite Unit(s) **2)**

UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits

2.2) Conditions

- Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory meet the requirements of this unit and its pre-requisite requirements.
- A 'licensed electrician' applying for an 'electrical contractors licence' may be required to undertake this unit to demonstrate their currency with verification of compliance requirements. In this case they are deemed to have met the pre-requisites for this unit provided that:
  - they hold a current 'electricians licence' or its equivalent issued in an Australian State or Territory and
  - have recently been in permanent employment as a licensed electrician sufficient to evidence current knowledge of applicable standards and regulations.

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The

Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4**)

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

Work which requires an electrical licence includes work on and/or supervision of electrical installations at or above low voltage.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to inspect and test an electrical installation.	1.1 OHS measures for the site are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4 Documentation or deemed to comply standard on which installation is based is reviewed and understood.
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
	1.6 Tools, equipment and testing devices needed to

ELEMENT	PERFORMANCE CRITERIA	
		verify compliance are obtained in accordance with established procedures and checked for correct operation and safety.
	1.7	Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Visually inspect and conduct safety testing on the installation.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Wiring is checked for suitability for the environments in which they are installed and suitably protected from damage or overheating.
	2.5	Cable conductor sizes are confirmed as meeting current-carrying capacity requirements and voltage-drop and fault-loop impedance limitations.
	2.6	Protection methods and devices are validated as meeting co-ordination requirements for overload and short-circuit protection.
	2.7	Switchgear and control gear is validated as being appropriately rated and meeting functional requirements.
	2.8	Evidence that electrical equipment complies with safety requirements is cited.
	2.9	Earthing system components are checked that they are correctly located and conductors correctly sized.
	2.10	Marking on switchboards are checked for accuracy and clarity and comply with requirements.
	2.11	Mandatory tests are conducted to verify that: earthing conductor resistance is sufficiently low; insulation resistance is sufficiently high; all polarities are correct; and circuit connections are correct as per

ELEMENT	PERFORMANCE CRITERIA	
		AS/NZS3000.
	2.12	Testing is conducted to verify that: fault-loop impedance is sufficiently low and residual current devices operates as intended as per AS/NZS3000.
3 Report inspection and test findings.	3.1	OHS risk control work completion measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Non-compliance defects are identified and reported in accordance with established procedures.
	3.4	Recommendations for rectifying defects are made in accordance with established procedures.
	3.5	Mandatory documentation is completed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying compliance and functionality of general electrical installations.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices.

KS01-EG105A Electrical installations — verification and testing

Evidence shall show an understanding of electrical installations testing and verification to an extent indicated by the following aspects:

T1 Electrical safety encompassing:

- Safety procedures for working on electrical systems, circuits and apparatus.
- Safe working practices as a normal part of carrying out electrical installation work
- Isolation and lockout procedures
- Tools and equipment needed to conduct electrical installation compliance inspection and testing.

REQUIRED SKILLS AND KNOWLEDGE

T2 Legislated regulations encompassing:

- legislation and regulations that require installations and equipment to be inspected and tested to ensure they are safe.
- the person/bodies responsible for the various aspects of ensuring electrical installations are safe.
- results of tests that show an electrical installation is safe for connection to the supply.
- results of periodic inspection and tests that show construction site wiring and equipment is safe to use.
- results of periodic inspection and tests that show electrical equipment are safe to use.

T3 Visual inspection of installations for compliance with the Wiring Rules encompassing:

- Protection requirements
- General condition
- Consumers mains/submains
- Switchboards
- Wiring systems
- Equipment and accessories
- Earthing

T4 Testing installations encompassing:

- tests to ensure: insulation resistance is adequate; earth continuity is such that it will ensure the operation of protection devices under earth fault conditions; polarity of active/s and neutral for mains, submains and final subcircuits is correct; there is no transposition of earthing and neutral conductors; fault-loop impedance is sufficiently low; RCD for correct operation and sensitivity.
- functional tests to ensure active/s and neutral for the same circuit are clearly identified with their circuit protection device.
- tests that show all circuits and devices operate as intended.
- tests to determine the fault level at a particular point in an installation.

T5 Documentation encompassing:

- results of tests conducted on an installation to comply with requirements and ensure the installation is safe.
- documents of the results of testing an installation as required by the local supply authority.
- documents of periodic inspection and testing of construction site wiring and equipment in accordance with requirement.
- documents of periodic testing and inspection of electrical equipment including tagging requirements.

KS02-EG105A Electrical installations and equipment — principles and requirements

Evidence shall show an understanding of electrical installations and equipment principles

REQUIRED SKILLS AND KNOWLEDGE

and requirements to an extent indicated by the following aspects:

T1 Effects of electric current encompassing:

- Physiological effects of current.
- Basic principles by which an electric current can produce heat, light, motion and a chemical reaction.

T2 Single path practical circuit encompassing:

- Arrangement of energy source, protection device, switch and load in a circuit.
- The purpose of each component in the circuit.
- Consequences of an open-circuits, closed-circuits and short-circuits.

T3 Single-source multiple-path d.c. circuits encompassing:

- Circuit configurations and connection.
- Relationship between the parameters of voltage, current, resistance and power dissipation in the whole or any part of the circuit.
- Safely measuring the parameters for the whole or any part of the circuit.
- Methods of determining circuit behaviour for variation in any of the parameters from measured and calculated values.

T4 Alternating voltage and current generation, phase relationships, energy in an a.c. circuit encompassing:

- Sinusoidal voltage generation and resulting current.
- The terms period; maximum value; peak-to-peak value; instantaneous value; average value; root-mean-square (r.m.s.) value; and frequency.
- Three-phases generation.
- Relationship between the phase voltages generated in a three-phase alternator and the conventions for identifying each.
- Method of determining the phase sequence or phase rotation of a three-phase supply.
- Methods of determining power and energy supplied by three phase circuits.

T5 Fundamental safety principles of the AS/NZS 3000 Part 1 (Section 1) and deemed to comply solution given in Part 2 encompassing:

- Definition of terms
- Fundamental safety principles of protection against direct and indirect contact with live parts; thermal effects; overcurrent; earth faults; abnormal voltages; spread of fire; mechanical injury and external influences.
- Fundamental principles of installation design; selection and installation of equipment; means of compliance (including alterations, additions and repairs) and verification of compliance.

T6 Electric motor selection, starting method and overload protection encompassing:

- Types of motor enclosures suitable for given environmental conditions
- Criteria for selecting motor starters and overload protection.
- Types and connection arrangements for direct-on-line and reduced voltage starters.

REQUIRED SKILLS AND KNOWLEDGE

- Thermal, magnetic and thermistor overload protection methods.

T7 Ability to apply AS/NZ 3000 requirements for protective and functional earthing encompassing:

- Purpose of protective and functional earthing.
- Parts of the protective earthing systems.
- Earthing arrangements, earthing of equipment and equipotential bonding.
- Methods of determining the maximum fault loop impedance for a circuit.
- Selection of protective conductor and active conductor sizes for each circuit to ensure earth-fault loop impedance is sufficiently low to operate the circuit protective device.

T8 MEN system and its application encompassing:

- The roles of the protective earthing (PE) and neutral (N) conductors in an a consumer's installation and their relationship to the protective earth neutral (PEN) conductor in the electricity distributor's system or sub-main to an outbuilding.
- The importance of the MEN link when a fault occurs.
- The likely consequences of the absence of the MEN link or high impendence in the PEN conductor when a fault occurs.
- The requirements for installation of an MEN link in an installation and an outbuilding.

T9 Knowledge of the application of transformers encompassing:

- Transformers used in distribution and transmission systems and large consumer installations.
- Transformers used in welding machines.
- Applications in appliances
- Risks and safety control measures associated with connection and disconnection of instrument transformers
- Safe working procedures when connecting and testing transformers.
- AS/NZS 3000 requirements and restriction on the installation and use of transformers.

T10 Ability to apply AS/NZ 3000 requirements for protection of circuit against overcurrent and abnormal voltages encompassing:

- Minimum fault levels specified by electricity distributors
- Methods and arrangement for protection against short-circuit currents and overload currents.
- Coordination of overload and short-circuit protection devices.
- Coordination between conductors and overload protection devices.
- Causes of over and undervoltage.
- Device and requirements for protection against over and undervoltage.

T11 Additional protection by use of RCDs and use of extra-low voltage for basic and fault protection encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Limitation of an RCD to protect against contact with live parts
- AS/NZS 3000 requirements for use of RCDs.
- Conditions for use of extra-low voltage to provide for basic and fault protection
- AS/NZS 3000 requirements for installation of SELV and PELV systems

T12 Ability to select cables for single and three phase mains and sub-mains for single and multiple installations that comply with requirements of AS/NZS 3000 and AS/NZS 3008.1 encompassing:

- Methods of determining maximum demand.
- Types of cables available.
- Installation methods and external influences effecting cable current-carrying capacity
- Voltage drop limitation
- Short-circuit performance consideration.

T13 Ability to select cables for final sub-circuits that comply with requirements of AS/NZS 3000 and AS/NZS 3008.1 encompassing:

- Maximum demand of final sub-circuits.
- Types of cables available.
- Installation methods and external influences effecting cable current-carrying capacity
- Effect of earth-fault loop impedance and voltage drop limitations on circuit route length.
- Short-circuit performance considerations.

T14 Ability to apply AS/NZS 3000 requirements for control and protection of installations encompassing:

- Devices for functions of isolation; emergency; Mechanical maintenance and functional control.
- Method for assessing prospective short circuit current.
- Devices and arrangement for protection against overload and short-circuit current.
- Additional protection by RCD
- Protection against switchboard internal arc faults.

T15 Ability to apply AS/NZS 3000 requirements for the installation of electrical equipment in given damp situations encompassing:

- Limitation of installation of equipment in classified zones.
- Selection and location of equipment suitable for installation in given classified zones.
- Additional protection by RCD.
- Equipotential bonding in showers and bathrooms and swimming and spa pools.

T16 Ability to install, modify and test electrical equipment for construction and demolition sites, complying with AS/NZS 3012 and applicable workplace safety legislation encompassing:

- Supply and installation requirements.
- Protection of circuits.

REQUIRED SKILLS AND KNOWLEDGE

- Initial and periodic inspection and testing
- Portable tool safety testing and tagging system in accordance with AS/NZS 3760.

T17 Knowledge of AS/NZS 3000 requirements for the installation of aerial conductors and underground wiring encompassing:

- Types and application of aerial conductors
- Aerial span limitations and required clearances
- Selection of aerial supporting poles/post and struts for a given application.
- Use and requirements of catenary support systems
- Acceptable cable types and protection for underground wiring categories.
- Underground wiring depth layer and protection
- Underground wiring clearances from other services

T18 Knowledge of AS/NZS 3000 requirements for electrical installations in hazardous areas encompassing:

- Types of areas classified as a hazardous area
- Standards to which the selection, installation and maintenance of electrical equipment shall comply.
- Additional training required to work competently with electrical equipment for hazardous areas
- T19 Ability to verify compliance of an electrical installation in accordance with AS/NZS 3000 encompassing:
- Visual inspection to determine whether the installation complies with requirements set out in Section 2 to 7 of AS/NZS 3000 and relevant specific installation standards.
- Mandatory tests following guidance given in AS/NZS 3017

T20 Ability to perform effective safe isolation of any equipment encompassing:

- Preparation of a ‘safe work method statement’ (SWMS) or Job Safety Analysis (JSA) for effective safe isolation.
- Safe methods for identifying source of supply to be isolated.
- Switching-off, lock-out and tagging procedures.
- Safe methods for confirming effective and safe isolation

T21 Ability to apply AS/NZS 3000 requirements to install and terminate thermoplastic insulated cables; elastomer sheathed cables; XLPE sheathed cables; and high temperature cables; armoured cables; and neutral screened cables in a wide range of applications.

T22 Ability to perform the circuit tests required for electrical cables in a range of installations and final sub-circuit encompassing:

- Following safe testing procedures.
- Tests to show if the earth continuity and earth-fault loop impedance are sufficiently low.
- Testing to show if insulation resistance is sufficiently high.
- Testing to show if the polarity and circuit connections are correct.

REQUIRED SKILLS AND KNOWLEDGE

T23 Ability to install final sub-circuit wiring into switchboards and connect to switchboard equipment in accordance with AS/NZS 3000 and electricity distributor's requirements.

T24 Ability to apply AS/NZS 3000 and electricity distributor's requirements for the installation and connect consumers mains encompassing:

- Installing of underground and overhead consumers mains
- Terminating consumers mains at pillars, pits mains connection boxes and consumers switchboard.
- Install unprotected consumers mains to reduce the risk of short-circuit current to a minimum.
- Installing bonding conductors where required.

T25 Ability to read, sketch and interpret electrical diagrams encompassing:

- Purpose and characteristics of schematic, block and wiring diagrams, plans and schedules.
- Conventions used in documenting electrical information
- Read and interpret schematic, block and wiring diagrams, plans and schedules
- Sketch electrical diagrams using conventional symbols

T26 Knowledge and understanding occupational safety and health encompassing:

- Basics of Occupational Safety and Health regulations
- Legal responsibilities for employers and employees
- Employers' and employees' own "duty of care".
- Safety committees and their role

T27 Knowledge and understanding of the requirements for personal safety in the workplace encompassing:

- Purpose and use of Safe Work Method Statements (SWMS) or Job Safety Analysis (JSA).
- Purpose and process of reporting OHS incidents.
- Safety procedures for working with electrical circuits and equipment.
- Procedures for safe and effective isolation of electrical supply.
- Regulations for the supervision of apprentices and trainees.

T28 Process in rescuing a person in contact with live electrical conductors or equipment and the primary importance of the safety of the rescuer.

T29 Application of emergency first aid requirements for an electric shock victim encompassing:

- Calling for help.
- Applying cardiopulmonary resuscitation (CPR).
- Selection and use of fire extinguishers to control electrical fire at accident site.

T30 Dangers of high voltage equipment and distribution systems encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Step and touch and induced voltages.
- Sources of induced voltage and stored energy
- Creepage and clearance requirements.
- Application of safe working procedures in the vicinity of HV equipment.

T31 Systematic method of commissioning and decommissioning electrical equipment and installations encompassing:

- Commissioning safety procedures
- Circuit voltage testing
- Phase rotation checks
- Functional testing
- Instrument and control parameter settings
- Decommissioning safety procedures.
- Identification of circuits with their control and protection devices.
- Impact of isolation on other parts of an installation.
- Tagging, testing and earthing.
- Safe removal of equipment.

T32 Diagnosing and rectifying faults in electrical apparatus and associated circuits encompassing:

- Faults such as open-circuit; short-circuit; incorrect connections; insulation failure; unsafe condition; apparatus/component failure; related mechanical failure;
- Apparatus such as control devices; fixed appliances/accessories; lighting; electrical machines motors and controls; socket outlets, transformers; protection and metering devices.
- Circuits such as those supplying fixed appliances; lighting; socket outlets; motors and controls circuits; transformers; electronic or computer based equipment.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment,

EVIDENCE GUIDE

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Verify compliance and functionality of general electrical installations as described as described in 8) and including:
    - A Selecting correct tools and testing equipment.
    - B Identifying visual non-compliance defects.
    - C Using effective methods for conducting mandatory and optional tests.
    - D Identifying non-compliance from test results.
    - E Identifying causes of non-compliance.
    - F Completing mandatory reporting.
    - G Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

EVIDENCE GUIDE

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to verifying compliance and functionality of general electrical installations.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to verifying compliance and functionality of at least two general electrical installations comprising a main switchboard, supplying more than one circuit each for, lighting, socket outlets, and fixed appliances. One of the installations shall include a distribution board separate from the main switchboard and at least one circuit supplying a three-phase load and a safety system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other

RANGE STATEMENT

terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.3) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.3) Literacy and numeracy skills

Competency Field **5**)

Electrical

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

Modification History

Release	Action	Core/Elective	Details	Points
3	Edit		In Pre-requisites, edit code to reflect correct unit title UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
3	Edit		In Pre-requisites, edit name to reflect correct unit title UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers the termination of cables and cords and their conductors at accessories and current-using devices designed to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to standards, understanding wiring system and cable types and applications, selecting appropriate termination accessories, preparing and terminating cables and cords, terminating cables/cord conductors and ensuring completed termination complies with requirements.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to terminate cables, cords and conductors	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards that have not previously been identified are noted and established risk control measures are implemented.

ELEMENT	PERFORMANCE CRITERIA	
	1.4	The junction box/ terminal enclosures and terminal types are inspected to select the type and size of cable and conductor termination devices needed.
	1.5	Tools, materials and testing devices needed to for terminating cables and cords are obtained in accordance with established procedures and checked for correct operation and safety.
2 Terminate cables, cords and conductors	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.3	Cable/cord ends are cut and sheath/insulation stripped with sufficient length to prevent stain on terminations and without undue waste.
	2.4	Cable glands/retaining devices are fitted and secured to ensure cable/cord cannot be pulled out of entry into junction box/ terminal enclosure
.	2.5	Conductors are prepared to suit the type of terminal at which there are to be connected.
	2.6	Conductors are terminated to ensure continuity across the terminal.
	2.7	Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
	2.8	Unexpected situations are dealt with safely and with the approval of an authorised person.
3 Test terminated cables and cords	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Terminated cables are tested to ensure continuity and insulation resistance comply with requirements.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and terminating cables, cords and accessories for low voltage circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG106A Wiring systems types, application and terminations

Evidence shall show an understanding of wiring systems types, application and terminations to an extent indicated by the following aspects:

T1 Cable types and terminations encompassing:

- cable variates (single cables, flexible cables, flexible cords, shielded cables, armoured cables, ribbon cables, other similar and like cables)
- structural components of cables and their purpose (conductor material, stranding, insulation type, voltage rating, screening, sheathing, armour and serving)
- Australian and International colour standards for cords and cables
- construction of common cables
- identification of cords and cables by conductor size, type and rating
- application of various cords and cables types
- identification of hardware used in terminating cords and cables
- preparation and termination of cords and cables
- termination of cords and cables using crimp lugs, tunnel connectors, soldering and solderless lugs
- requirements to protect and support cables adequately (protection against mechanical damage, protection from adverse temperatures and corrosion and protection from magnetic field that may affect the performance of the cable).

T2 Cords, cables and plugs encompassing:

- selection of flexible cords for given applications
- preparation of cord ends for connection
- fitting standard three pin plug tops to a flexible cords
- fitting standard three pin extension sockets to a flexible cords
- connecting variety of plugs to different flexible cord types
- requirements of AS/NZS 3000 for flexible cords, cables and plugs
- using test equipment to test and locate various faults in flexible cords and cables.

T3 Flat TPS wiring systems encompassing:

- Australian Standards requirements for the termination and protection of flat TPS cable

REQUIRED SKILLS AND KNOWLEDGE

- Installation of flat TPS cable in trunking and duct for the supply of socket outlets
- using flat TPS cable for lighting looms
- testing circuits to ensure they are safe and operate as intended

T4 Circular TPS wiring systems encompassing:

- Australian Standards requirements for the installation of circular TPS cable
- installation of circular TPS cables on cable ladder/tray
- installation of circular TPS cable
- testing circuits to ensure they are safe and operate as intended

T5 Thermoplastic insulated cables in non-metallic enclosures encompassing:

- Australian Standards requirements for the installation of non-metallic enclosures
- cutting and setting rigid non-metallic ducting, trunking and conduit and accessories
- installation of circuits using TPI cables in non-metallic enclosures
- testing circuits to ensure they are safe and operate as intended

T6 Thermoplastic insulated cables in metallic enclosures encompassing:

- Australian Standards requirements for the installation of metallic enclosures
- fitting metallic conduit to metallic trunking and accessories
- cutting, threading and setting metallic conduit
- installation of circuits using thermoplastic insulated cables in metallic conduit, ducting and trunking
- testing circuits to ensure they are safe and operate as intended

T7 Fire protection cabling and systems encompassing:

- Australian Standards requirements for the installation of fire protection cable and mineral insulated metal sheathed cables
- requirements when passing a wiring system through a fire rated wall or floor
- recognising different fire protection cable types including Pyrolex, Radox and MIMS
- termination of fire protection cable.
- installation of circuits using fire protection cable.
- testing circuits to ensure they are safe and operate as intended

T8 Steel wire armoured (SWA) cables encompassing:

- Australian Standards requirements for the installation of SWA cables
- identifying accessories used with SWA cables
- installation of circuits using SWA cables
- testing circuits to ensure they are safe and operate as intended

T9 Trailing cables and catenary systems encompassing:

- Australian Standards requirements for the installation of trailing cables and catenary wiring

REQUIRED SKILLS AND KNOWLEDGE

- identifying equipment used with trailing cable and catenary systems
- installation of catenary wiring systems
- installation of trailing cable systems supplying pendant sockets
- testing the installation to ensure it is safe and operates as intended

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

EVIDENCE GUIDE

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:

EVIDENCE GUIDE

- Install wiring and accessories for low voltage circuits as described as described in 8) and including:

A Selecting appropriate cable/cord and conductor devices

B Cutting cable ends and stripping sheath/insulation to a sufficient length

C Fitting and securing cable glands/retaining devices correctly

D Preparing and terminating conducts to suit the type of terminal at which there are to be connected.

E Testing completed cables to ensure compliant continuity and insulation resistance

F Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing wiring and accessories for low voltage circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

EVIDENCE GUIDE

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by terminating at least five different types of cables each at a junction box and a device terminal enclosure.

Cable types with copper conductors:

- Thermoplastic insulated cable (TPI)
- Flat thermoplastic sheathed (TPS)
- Circular thermoplastic sheathed (TPS)
- Steel wire armoured (SWA)
- Mineral insulated metal sheathed (MIMS)
- Flexible cables
- Flexible cords
- Aluminium conductor/cable

AND

Terminate their conductors at each of the follow

Terminal types

- Tunnel terminal
- Stud terminal

RANGE STATEMENT

- Screw terminal

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

Custom Content Section

Competency Field **5)**

Electrical

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers selecting wiring systems and cables for electrical installations operating at voltages up to 1,000V a.c. or 1,500 V d.c. It encompass knowledge and application of wiring systems and cable types, selecting wiring system compatible with the installation conditions, selecting cables that comply with required current-carrying capacity and voltage drop and earth fault-loop impedance limitations, coordination between protective devices and conductors and documenting selection decisions

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:
1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work

1.2) License to practice

platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits

Prerequisite Unit(s) **2)**

UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to select wiring systems and cables for general electrical installations	1.1 The extent and nature of the electrical installation is determined from job specifications.
	1.2 Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.
	1.3 Cable routes, the route lengths of cables and the conditions in which the wiring system is to operate is determined from job specifications or from consultation with appropriate persons.
2 Select wiring systems and cables for general electrical installations	2.1 Wiring systems are selected for suitability for the environments in which they are to operate.
	2.2 Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and earth fault-loop impedance limitations.
	2.3 Circuit protective devices are selected to meet requirement for co-ordination with conductor current-carrying capacity.
	2.4 Earthing system components are selected to meet requirements of an MEN system.
	2.5 Evidence is obtained that electrical equipment selected complies with safety requirements.
3 Document electrical installation.	3.1 Evidence is obtained from manufacturers/suppliers that electrical equipment selected complies with safety requirements.
	3.2 Reasons for selections made, including calculations, are documented in accordance with established procedures.
	3.3 Electrical installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of selecting wiring systems and cables for general electrical installations.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG107A Electrical installation — cable selection and co-ordination

Evidence shall show an understanding of selecting cables and ensuring co-ordination between protection device and conductors in electrical installations that comply with the Wiring Rules, Selection of cables standards and Service Rules to an extent indicated by the following aspects:

T1 Performance requirements - design and safety encompassing:

- harmful effects against which the design of an electrical installation must provide protection.
- performance standards of a correctly functioning electrical installation.
- supply characteristics that shall be considered when designing an electrical installation.
- acceptable methods for determining the maximum demand in consumer's mains and sub-mains.
- AS/NZS 3000 requirements limiting voltage drop in an installation.
- reason for dividing electrical installations into circuits and the factors that shall determine their number and type.
- typical external factors that may damage an electrical installation and that shall be considered in the installation design.
- methods for protecting persons and livestock against direct and indirect contact with conductive parts and the typical application of each.
- acceptable methods of protection against the risks of ignition of flammable materials and injury by burns from the thermal effects of current, in normal service.
- likely sources of unwanted voltages and the methods for dealing with this potential hazard.
- acceptable methods for protecting persons and livestock against injury and property against damage from the effects of over current.
- requirement for protection against fault current.
- requirement for protection against the harmful effects of faults between live parts of circuits supplied at different voltages.
- need for protection against injury from mechanical movement and how this may be achieved.
- features of 'fire rated construction' and how the integrity of the fire rating can be maintained in relation to electrical installation.

REQUIRED SKILLS AND KNOWLEDGE

T2 Final subcircuit arrangements encompassing:

- factors that shall be considered in determining the number and type of circuits required for an installation.
- daily and seasonal demand for lighting, power, heating and other loads in a given installation.
- number and types of circuits required or a particular installation.
- current requirements for given final subcircuits.
- layout/schedule of circuits for given installations.

T3 Factors affecting the suitability of wiring systems encompassing:

- wiring systems typically used with various construction methods and particular environments.
- installation conditions that may affect the current-carrying capacity of cables.
- external influences that may affect the current-carrying capacity and/or may cause damage to the wiring system.
- AS/NZS 3000 requirements for selecting wiring systems for a range of circuits, installation conditions and construction methods into which the wiring system is to be installed. Note: Wiring systems include cable enclosures, underground wiring, aerial wiring, catenary support, emergency systems, busbar trunking and earth sheath return.

T4 Maximum demand on consumer’s mains/submains encompassing:

- acceptable methods for determining the maximum demand on an installation’s consumer’s mains and submains.
- maximum demand for the consumer's mains for given installations up to 400 A per phase.
- maximum demand for given submains.

T5 Cable selection based on current carrying capacity requirements encompassing:

- installation conditions for a range of wiring systems and applications.
- external influences that require the use of a derating factor.
- AS/NZS 3000 requirements for coordination of cables and protection devices.
- AS/NZS 3008 used to select conductor size based on the maximum current requirement for a given installation condition including any applicable derating factors.

T6 Cable selection based on voltage drop requirements encompassing:

- AS/NZS 3000 requirements for maximum voltage drop in an installation.
- relevant tables in AS/NZS 3008 for unit values of voltage drop.
- calculation of the expected voltage drop in a given circuit.
- selecting cables to satisfy voltage drop requirements in addition to current carrying capacity requirements.

T7 Cable selection based on fault loop impedance requirements encompassing:

- AS/NZS 3000 requirements for maximum fault loop impedance in an installation.
- relevant tables in AS/NZS 3008 to determine cable impedances.

REQUIRED SKILLS AND KNOWLEDGE

- calculation of the expected fault loop impedance for a given circuit arrangement.
- selecting cables to satisfy fault loop impedance requirements in addition to current carrying capacity requirements and voltage drop requirements.

T8 Selecting protection devices encompassing:

- acceptable methods of protection against indirect contact.
- AS/NZS 3000 requirements for selecting methods and devices to protect against indirect contact for a range of installation types and conditions.
- coordination between conductors and protection devices to ensures the protection of cables from over heating due to over current.
- possible injuries to persons and livestock from hazards due to a short circuit.
- AS/NZS 3000 requirements for selecting devices to protect against overload current for a range of circuits and loads.
- AS/NZS 3000 requirements for selecting devices to protect against short-circuit current for a range of installation conditions.

T9 Selecting devices for isolation and switching encompassing:

- requirements for the provision of the isolation of every circuit in an electrical installation.
- need for protection against mechanical movement of electrically activated equipment.
- AS/NZS 3000 requirements for selecting devices for isolation and switching for a range of installations and conditions.

T10 Switchboards encompassing:

- AS/NZS 3000 and local supply authority requirements for switchboards.
- tariff structures for the supply of electricity.
- equipment installed at the main switchboards with capacities up to 400 A per phase.
- layout of a main switchboard for an installation supplied with single phase single tariff whole current metering.
- layout of a main switchboard for an installation supplied with single phase multiple tariff whole current metering.
- layout of a main switchboard for an installation supplied with multiphase single tariff whole current metering.
- layout of a main switchboard for an installation supplied with multiphase multiple tariff whole current metering.
- layout of a main switchboard for a multiple tenancy installation with whole current metering.
- layout of a main switchboard, including metering, for an installation supplied with three phase CT metering.
- local supply authority requirements for connection of an electrical installation to the electrical supply system

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

EVIDENCE GUIDE

competency in this unit

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Selecting wiring systems and cables for general electrical installations as described as in 8) and including:

    A Determining the extent and nature of the installation for job specifications

    B Obtaining and understand the safety and other regulatory requirements to which the electrical installation shall comply

    C Determining cable routes, the route lengths of cables and the conditions in which the wiring system is to operate.

    D Selecting wiring system suitable for the environment requirements.

    E Selecting cable conductors sizes in consideration to current-carrying capacity and voltage-drop / earth

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fault-loop limitation.

F Ensuring co-ordination between circuit protective device and conductor current-carrying capacity.

G Selecting compliant earthing system components

H Documenting wiring systems and cables to be used, specification for items selected and reasons for the selections made.

I Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to selecting and arranging equipment for general electrical installations.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent

9.5)

EVIDENCE GUIDE

assessment and relationship with other units	For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEE063A	Arrange circuits, control and protection for general electrical installations

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to selecting and selecting wiring systems and cables for at least two general electrical installations comprising a main switchboard, supplying more than one circuit each for, lighting, socket outlets, and fixed appliances. One of the installations shall include a distribution board separate from the main switchboard and at least one circuit supplying a three-phase load and a fire pump.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

Custom Content Section

Competency Field **5)**

Electrical

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers trouble-shooting and repairing faults in electrical apparatus and interconnecting circuits and equipment operating at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely, reading circuit diagrams, sketching diagrams from traced wiring, logically applying fault finding procedures, conducting repairs and completing the necessary service documentation.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuits
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to trouble-shoot and	1.1	The extent and nature of the electrical installation is determined from job

ELEMENT	PERFORMANCE CRITERIA	
rectify faults.		specifications.
	1.2	Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.
	1.3	OHS procedures for a given work area are identified, obtained and understood.
	1.4	OHS risk control measures and procedures in preparation for the work are followed.
	1.5	The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).
	1.6	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
2 Trouble-shoot and repair faults.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.
	2.5	Trouble-shooting is approached methodically drawing on knowledge of electrical circuits and apparatus using measured and calculated values of circuit/apparatus parameters.
	2.6	Circuit/apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.
	2.7	Faulty circuits/components are rechecked and

ELEMENT	PERFORMANCE CRITERIA	
		their fault status and acquired.
	2.8	Materials/replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.
	2.9	Effectiveness of the repair is tested in accordance with established procedures.
	2.10	Apparatus is reassembled, finally tested and prepared for return to service.
	2.11	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.12	Trouble-shooting and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Completion and report trouble-shoot and repair activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work area is cleaned and made safe in accordance with established procedures.
	3.3	Written justification is made for repairs to apparatus.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

REQUIRED SKILLS AND KNOWLEDGE

Evidence shall show that knowledge has been acquired of safe working practices and trouble-shooting and repairing faults in electrical apparatus and circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG108A Electrical circuit and equipment faults and fault finding techniques

Evidence shall show an understanding of electrical circuit and equipment faults and fault finding techniques to an extent indicated by the following aspects:

T1 Troubleshooting concepts encompassing:

- need to understand the correct operation of a circuit or equipment, switching and control circuit arrangements.
- common faults with circuits and equipment including operator faults, incorrect connections, open-circuits, short-circuits, device faults (mechanical), supply faults.
- typical faults symptoms and their causes: operation of circuit protective device, appliance does not operate, single phase motor does not develop enough torque to drive the load, three phase motor does not develop enough torque to drive the load, motor overload trips
- factors to consider in clarifying the nature of a fault: initial fault report, confirmation of symptoms of the fault, comparison of symptoms with normal operation
- effect to cause reasoning — assumptions of possible causes
- methods for testing assumptions: visual inspection, component isolation, test equipment, sectional testing, split-half tests
- repairing the fault and the steps needed to ensure fault doesn't re-occur
- dealing with intermittent faults (typical causes of intermittent faults are vibration, shock, changes in temperature and electromagnetic interference).
- final testing and re commissioning

T2 Troubleshooting water heater and appliance circuits/equipment encompassing:

- circuit diagrams of common single phase and three phase hot water systems
- single phase and three phase element resistance values (determined from measurement and calculation from power and voltage ratings)
- testing single and three phase elements for correct insulation resistance and continuity
- element replacement techniques
- operation of thermostats, thermal cut-outs and pressure relief valves, flow switches and checking sacrificial anodes
- locating faults in common single and three phase hot water systems
- repairing faulty water heating systems

T3 Troubleshooting electrical appliance circuits/equipment encompassing:

- circuit diagrams of common single phase and three phase appliances
- methods to determine the cause of an RCD operation

REQUIRED SKILLS AND KNOWLEDGE

- identification of appliances that is causing an RCD to trip
- testing single and three phase appliances for correct insulation resistance and continuity
- operation of appliances controls
- locating faults in common single and three phase appliances
- repairing faulty appliances

T4 Troubleshooting lighting circuits encompassing:

- circuit and wiring diagrams of common lighting circuits including single light controlled by a single switch, multiple lights controlled by a single switch, two and three way switching using the loop at the light method and the loop at the switch method.
- causes of wiring faults from supplied symptoms and circuit and/or wiring diagrams
- causes of faults in ELV lighting devices, include transformer (iron core or electronic), voltage drop, heat, over-voltage, poor connections, incompatible dimmers
- diagrams of a basic fluorescent light circuit including lamp, ballast and starter
- locating faults in fluorescent light circuits
- operation of a range of lighting control including passive infra-red (PIR), dimmers, photo electric or day-light switches and time clocks
- locating faults in lighting control circuits

T5 Troubleshooting single phase motor and control circuits encompassing:

- circuit diagrams of split phase, capacitor start, capacitor start capacitor run, universal and shaded pole single phase motors
- causes of single phase motor faults from supplied symptoms and circuit diagrams
- causes of electrical faults in single phase motors, include open and partially open circuit winding, short and partially short circuit winding, open circuit rotor, burnt out winding, coil shorted to frame.
- reasons for a thermal overload trip and how often they are to be reset before investigating a cause
- internal mechanical faults and their consequences, include bearings, fans, bent shaft, locked rotor, blocked air vents, centrifugal switches, environmental factors
- faults on driven loads and couplings and their consequences, include slipping belts, poorly aligned coupling (shims), vibration, loads bearing failing, load stalling.
- locating faults in single phase motors and their controls

T6 Troubleshooting three phase induction motor encompassing:

- circuit diagrams of three phase induction motors
- causes of three phase motor faults from supplied symptoms and circuit diagrams
- causes of electrical faults in three phase motors, include open and partially open circuit phase winding, short and partially short circuit phase winding, open circuit rotor, burnt out phase winding, coil shorted to frame.
- reasons for a thermal overload trip and how often they are to be reset before investigating a cause
- internal mechanical faults and their consequences, include bearings, fans, bent shaft, locked rotor, blocked air vents, environmental factors.

REQUIRED SKILLS AND KNOWLEDGE

- faults on driven loads and couplings and their consequences, include slipping belts, poorly aligned coupling (shims), vibration, loads bearing failing, load stalling.
- locating faults in three phase induction motors and their controls

T7 Troubleshooting electrical installations encompassing:

- circuit diagrams, wiring diagrams, cable schedules and specifications of electrical installations
- causes of electrical installation faults from supplied symptoms and circuit diagrams include open and partially open circuit wiring, short and partially short circuit wiring, low insulation resistance, incorrect polarity, transposition of conductors, RCD tripping.
- locating faults in electrical installations
- repairing faulty electrical installation circuits components and wiring.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required

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and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
    - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
    - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
    - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
    - Demonstrate an appropriate level of skills enabling employment
    - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:

EVIDENCE GUIDE

- Find and repair faults in electrical apparatus and circuits as described as described in 8) and including:

  A Envisaging the likely extent of the fault and the work from fault/breakdown reports and/or discussion to elicit information on the fault/breakdown with appropriate person(s).

  B Using appropriate tools and resources, and methodical fault finding techniques.

  C Locating and trouble-shooting faults efficiently.

  D Conducting tests or measurements in strict accordance with OHS and electrical safe working requirements.

  E Rectifying faults effectively.

  F Reporting cause of the fault and justifying the repairs undertaken.

  G Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to trouble-shooting and repairing faults in electrical apparatus and circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3

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'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG109A	Develop and connect electrical control circuits t

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in trouble-shooting and repairing faults in electrical apparatus and circuits designed for voltages up to 1000 V a.c. or 1500 V d.c in at least:

Four of the following **equipment and associated circuit**

- Switchboards
- Protective devices
- Lighting
- Heating
- Socket outlets
- Control devices

and

Three of the following **machines and associated control circuits**

- Single phase motors
- Single phase motor controls
- Three phase motors

RANGE STATEMENT

- Three phase motor controls
- Synchronous machines
- DC machines
- DC machines controls
- Transformers and auxiliary components

Notes.

1. The different types of faults include; Open-circuit; Short-circuit; Incorrect connections; Insulation failure; Unsafe condition; Apparatus/component failure; Related mechanical failure; Other electrical apparatus and circuit faults

2. Examples of apparatus are Control devices; Fixed appliances/accessories; Lighting; Single phase motors and their controls; Socket outlets Three phase motors and their controls, synchronous machines and their controls, transformers and their controls, switchboards and/or distribution boards and their controls, protection and/or metering devices, a.c./d.c. machines and their controls other like equipment/accessories.

3. Examples of circuits include those supplying fixed appliances; lighting; single-phase motors; socket outlets; three phase motors and controls circuits; machines and transformers; electronic or computer based equipment other like equipment/accessories.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

Custom Content Section

Competency Field **5)**

Electrical

UEENEEG109A Develop and connect electrical control circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers developing, connecting and functionally testing electrical power and control circuits that perform specific control functions. It encompasses working safely; developing schematic/ladder diagrams and converting them to wiring diagrams; selecting and connecting contactors and control devices to perform a specific function.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of

competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Develop and prepare to connect electrical control circuits.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4 Control scenarios are determined from discussions with appropriate person(s) and documented in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA	
	1.5	Agreement for the control scenarios is sought from appropriate person(s) and documented in accordance with established procedures.
	1.6	Schematic arrangement of control circuits that complies with agreed scenarios is documented in accordance with established procedures.
	1.7	Materials needed to connect control circuits are obtained in accordance with established procedures and checked against job requirements.
	1.8	Tools, equipment and testing devices needed to connect control circuits are obtained in accordance with established procedures and checked for correct operation and safety.
	1.9	Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Connect and test electrical control circuits.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Control circuit components are connected to comply with the agreed control scenario.
	2.5	Control circuit operation is tested for agreed functionality and in strict accordance with OHS requirements and established safety procedures.
	2.6	Non-compliant control functions are rectified to comply with the agreed control scenario.
	2.7	Unexpected situations are dealt with safely and with the approval of an authorised person.

ELEMENT	PERFORMANCE CRITERIA	
	2.8	Control circuits are connected and tested efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practice.
3 Completion and document circuit development activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	'As-connected' control circuits are documented using standard drawing conventions and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing and connecting control circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG109A Electrical control devices and circuits

Evidence shall show an understanding of electrical control devices and circuits to an extent indicated by the following aspects:

T1 Basic relay circuits encompassing:

- Identification of given circuit diagrams (schematic) symbols and explain the operation of the components represented
- labelling wires and terminal (numbering systems)
- control relay - operating principles, basic contact configurations and identification and common applications
- push button - switching configurations and common applications
- selecting pushbuttons/pilot lamps from manufacturer’s catalogues for specific

REQUIRED SKILLS AND KNOWLEDGE

applications

- development of simple stop-start relay circuit that incorporates pilot lights and latching circuit.
- connection and testing of control circuits

T2 Relay circuits and drawing conventions encompassing:

- circuit diagram drawing conventions
- selecting relays from manufacturers' catalogue for specified applications
- circuit development of electrical control circuit in accordance with a written description (specification) and list the sequence of operation of the circuit
- connecting simple electrical control circuit from circuit diagrams
- applying safe working practices when testing an electrical control circuit

T3 Remote STOP-START control and electrical interlocking encompassing:

- operation of local and remote start-stop control of relays
- operation of an electrically interlocked relay circuit
- development of a relay circuit incorporating local and remote start and stop buttons and electrical interlocking.
- connecting electrical circuits with local and remote start-stop control and with electrical interlocking.
- applying circuit checking and testing techniques to an electrical control circuit.

T4 Time delay relays encompassing:

- timers - operating principles, basic contact configurations and identification and common applications
- selecting timers for specified functions from manufactures' catalogues
- development of timer controlled circuits from a written description and list the sequence of circuit operation
- connecting a timer controlled circuit using a circuit diagram as a guide.
- timer circuit checking and testing procedures.

T5 Circuits using contactors encompassing:

- contactors - operating principles, basic contact configurations and identification and common applications
- thermal overloads - operating principles, basic contact configurations and identification and common applications
- circuit diagram symbols
- circuit development using a contactor
- using contactors for motor control.
- compliance requirements for devices for isolating circuits.

T6 Jogging and interlocking encompassing:

- purpose and application of jogging control of motors
- operation of motor control using start, stop and jog buttons

REQUIRED SKILLS AND KNOWLEDGE

- purpose and application of electrical/mechanical interlocking
- developing a multiple motor starting circuit from a description of the circuit operation including jog and interlock functions.
- selecting circuit components using manufacturers' catalogues for appropriate duty ratings
- connecting and testing a multiple motor starting circuit which incorporates start, stop and jog control.

T7 Control devices encompassing:

- common control devices used in automatic control circuits: limit switches, proximity switches, photoelectric cells, pressure switches, float switches, light sensors and temperature sensors
- basic operating principles of common control devices
- advantages and disadvantages of common control devices
- applications for common control devices
- selecting control devices using manufacturers' catalogues for specified applications
- connection of control devices into control circuits

T8 Programmable relays encompassing:

- programmable relays - advantages over electromagnetic relay circuit control.
- typical applications of programmable relays.
- block diagram representation and basic operating principles
- input and output parameters, listing, connections and output types.
- connecting input and output devices to a programmable relay using a diagram
- basic programming of ladder circuits consisting of inputs, outputs i.e. stop-start circuit
- using the monitoring facility of the programmable relay to verify each ladder circuit operation.
- programming timers and using the monitoring facility of the programmable relay to check the values of the timer
- external devices
- implications of programming normally closed field devices
- conversion of control circuits
- installation of programmable control relays
- common faults and their symptoms

T9 Three-phase induction motor starters encompassing:

- reasons for limiting the starting current of large motors.
- requirements of the wiring rules (AS/NZS 3000) and the local supply authority service rules, with regard to starting and control of induction motors.
- DOL starter operating principles, applications and circuits
- electronic (soft) starter operating principles, applications and circuits
- connecting a DOL motor starter and testing the operation of the power and control circuits

REQUIRED SKILLS AND KNOWLEDGE

- installation of DOL and soft starters

T10 Three-phase induction motor starters- reduced voltage encompassing:

- star-delta starter operating principles and circuits
- primary resistance starter operating principles and circuits
- auto-transformer starter operating principles and circuits
- secondary resistance starter operating principles and circuits
- common applications for each starter type
- comparison of motor starters basic characteristics
- selecting the most suitable motor starter for a given situation
- connecting motor starter power and control circuits for correct operation
- measuring starting current and torque of selected motor starters
- installation of reduced voltage starters

T11 Three-phase induction motor reversal and braking encompassing:

- reversing operating principles and control circuits
- plug braking operating principles and circuits
- dynamic braking operating principles and circuits
- regenerative braking operating principles and circuits
- eddy current brakes operating principles and circuits
- mechanical brakes operating principles and circuits
- comparison of the difference braking methods used.
- typical applications for each braking method.
- connecting a circuit with a braking feature to operate a three-phase motor.
- installation of motor braking control circuits

T12 Three-phase induction motor speed control encompassing:

- pole changing operating principles and circuits
- variable frequency drives operating principles and circuits
- slip-ring motors operating principles and circuits
- installation of motor speed controllers.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with

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all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function

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and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Develop and connect control circuits as described as described in 8) and including:
    - A Determining control scenarios specifications.
    - B Developing schematic arrangement of control circuits that meets the required scenario as specified.
    - C Connecting control circuit to function as specified.
    - D Conducting safety and functional testing correctly
    - E Identifying and correcting non-compliant control functions.
    - F Documenting 'as-connected' control circuit.
    - G Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

EVIDENCE GUIDE

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to development and connecting electrical control circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG108B	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing, connecting and safety and functional testing on more than one occasion of at least four of the following control circuits:

RANGE STATEMENT

- Multiple light switching circuit
- Master control circuit
- Single stop-start circuit
- Multiple stop-start circuit
- Time controlled circuit
- Machine interlocked circuit
- Motor jogging circuit
- Machine safety circuit

and,

using at least five of the following devices

- Multi-way switches
- Switches with more than two positions and Off
- Push buttons
- Electromechanical relays
- Programmable relays
- Contactors
- Reversing contactors
- Three phase starters
- Reduced voltage starters

and

with at least two of the following transducers/sensors:

- Timers
- Limit switches
- Proximity switches
- Photoelectric cells
- Pressure switches
- Float switches
- Light sensors
- Temperature sensors

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers determining correct operation of complex polyphase power circuits and providing solutions as they apply to electrical power engineering work functions. It encompasses working safely, problem solving procedures, including using electrical measuring devices, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions.

Application of the Unit

Application of the Unit **4)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable

1.2) License to practice

contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits

and

UEENEEG102A	Solve problems in low voltage a.c. circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a

unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to provide engineering solutions to problems in complex polyphase power circuits.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Provide engineering solutions to problems in complex polyphase \ power circuits.	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used for solving circuit problems from measure and calculated values as they apply to complex polyphase power circuits.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.

ELEMENT	PERFORMANCE CRITERIA	
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document solutions for problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions for problems in complex polyphase power circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG149A Polyphase power circuit analysis

Evidence shall show an understanding of polyphase power circuit analysis to an extent indicated by the following aspects:

T1 Polyphase supply system encompassing:

- advantage of three phase system compared to single phase systems
- double subscript notation
- phase sequence
- 120 degree operator
- given circuit component parameters, solve practically based problems using:
- equivalent circuits of transformers, lines and loads.
- component values using rectangular and polar notation.
- current divider and potential divider rules using complex impedances.
- The “per unit” values of voltage, current, VA and impedance to a common VA base.

REQUIRED SKILLS AND KNOWLEDGE

T2 Types of three phase system connections encompassing:

- supply to balanced star, 3 and 4 wire loads
- supply to delta connected loads
- effects of phase reversal
- representation of currents and voltages as complex phasors for 3 phase and 3 phase and neutral quantities.
- calculation the values of and draw labeled phasor diagrams, not to scale, to represent complex values of current and voltage for balanced and unbalanced loads for star and delta systems.
- calculation of values of P, Q and S for balanced and unbalanced systems.
- draw and label single phase diagrams to represent 1 phase of a complex 3 phase system.
- represent unbalanced voltages or currents as symmetrical components.
- Phase to phase currents
- Phase to neutral/earth currents.

T3 Balanced three phase loads encompassing:

- calculations of balanced loads connected in star
- calculations of balanced loads connected in delta
- calculation of steady state values of fault current for various configurations.
- evaluation of the symmetrical component impedances for the various distribution system components. Transformers (earthed neutral case). Generators (high impedance earth)
- calculation of fault currents using the per unit approach.
- calculation using the “worst case” values based on transformer impedance only (ie., a short circuit fault)
- estimation of peak values using accepted multipliers.
- effects of the d.c. component on the instantaneous magnitudes of fault currents in transformers and generators.

T4 Unbalanced three phase loads encompassing:

- Star – 4 wire systems
- Delta systems
- Star – 3 wire systems
- Star 4 wire with neutral impedance

T5 Power in three-phase circuits encompassing:

- summation of phase powers and power in balanced loads
- measurement of power in balanced loads – 2 Wattmeter methods

T6 Reactive three phase power encompassing:

- power triangle calculation
- measurement of VAR

REQUIRED SKILLS AND KNOWLEDGE

- power factor correction

T7 Fault currents encompassing:

- symmetrical components
- positive, negative and zero sequence impedance
- fault current breaking and let-through energy capacities of circuit breakers, fuses
- importance of fault/arc impedance
- calculation of fault currents - phase-to-earth faults
- calculation of fault currents - phase-to-phase faults
- analysis of asymmetrical faults currents.

T8 Harmonics in three phase systems encompassing:

- presence of triple in harmonics in 3 phase systems
- effects of 3 phase harmonics for different star and delta connections.
- methods for reducing harmonics in three phase systems.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

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various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

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legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in complex polyphase power circuits as described in 8) and including:
    - A Determining the operating parameters of existing circuit.
    - B Using established problem solving methods.
    - C Taking relevant measurements accurately.
    - D Interpreting measured values appropriately.
    - E Providing effective solutions to circuit problems from measurements and calculations.
    - F Giving written justification of solutions provided.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to providing engineering solutions for solving problems in complex polyphase power circuits.

Method of

9.4)

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assessment	This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5**) There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to providing engineering solutions to complex polyphase power circuits as they apply to problems related to electrical power engineering diagnosis and development work functions in any of the following types of circuit problems:

- Determining the operating parameters of an existing complex circuit
- Altering an existing complex circuit to comply with specified operating parameters
- Developing complex circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

UEENEEG171A Install, set up and commission interval metering

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the installation, set up and commission of interval metering for measurement of energy use by consumers under choice of supplier arrangement. It encompasses working safely and to installation and set up standards, evaluating the integrity of metering wiring and earthing systems, fixing metering, making power and communication connections, setting meter parameters and completing the necessary documentation.

Application of the Unit

Application of the Unit **4)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 3 level or higher.

- license to practice in the workplace subject to regulations for undertaking of electrical work.

Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:
1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work

Application of the Unit **4)**

environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a license to practice in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s) **2)**

UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to install, set up and commission interval metering.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards that have not previously been identified are noted and established risk control measures are implemented. (Note 1.)
	1.4	Switchboard on which the meter is to be installed is inspected and evaluated for compliance with safety and functionality standards. (Note 2)
	1.5	Approval to rectify safety and/or functionality defects of the switchboard is sought from person of higher authority in accordance with established procedures.
	1.6	Installation of the meter and rectification work is prepared in consultation with other effected by the work and sequenced appropriately. (Note 3)
	1.7	Material needed for the work is obtained in accordance with established procedures and checked against job requirements.

ELEMENT	PERFORMANCE CRITERIA	
	1.8	Tools, equipment and testing devices needed to for the work are obtained in accordance with established procedures and checked for correct operation and safety.
2 Install, set up and commission interval metering.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Existing metering is checked as being isolated in strict accordance OHS requirements and procedures.
	2.4	Approved rectification work is carried out to comply with standards and in accordance with established procedures.
	2.5	Metering is installed to comply with technical standards and job specifications and requirements.
	2.6	Metering power and communication connections are made in accordance with manufacture's specifications and functional and regulatory requirements.
	2.7	Meter operating parameters are set in accordance with manufacture's specifications and functional and regulatory requirements.
	2.8	Unexpected situations are dealt with safely and with the approval of an authorised person
	2.9	Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.
	2.10	Metering installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
3 Completion and report metering installation activities.	3.1	OHS work completion risk control measures and procedures are followed and supply is reinstated to the installation.
	3.2	Work site is cleaned and made safe in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
	3.3 Final checks are made to that the installed metering conforms to requirements.
	3.4 'As-installed' metering and rectification work is documented and appropriate persons notified in accordance with established procedures.

Note.
1. Examples of hazards likely to be encountered are asbestos reinforced switchboard panels, deteriorating switchgear and cabling and location of the switchboard.
2. Safety and functionality standards include the clear identification of switchboard components and their function, sound electrical insulation of wiring and components, sound MEN and main earth connections, fire integrity and access.
3. Preparation includes arranging for the safe isolation of the installation, access to a telecommunications connection where two-way metering is to be installed and access to a transducer connection where gas metering is to be included.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing, setting up and commissioning of interval metering.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG171A Interval metering

Evidence shall show an understanding of interval metering to an extent indicated by the following aspects:

T1 Reasons for metering and the regulated market (Regulations)

T2 Metering layouts and requirements

- purpose, types and applications.
- metering equipment.
- varying arrangements for metering and meter layouts

T3 Interval metering concepts and installation

- Meter types
- Meter construction – block diagram
- Meter functions

REQUIRED SKILLS AND KNOWLEDGE

- Importing and exporting energy
- Classes of meters
- Single and polyphase meters
- Purpose, types and applications.
- Installation and power connection arrangements.
- Communication methods and arrangements.
- Connections for gas metering.
- Procedures for setting meter parameters.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries

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risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install and set up interval metering as described in 8) and including:

EVIDENCE GUIDE

A Inspecting and evaluating safety and functionality compliance of the switchboard accurately.

B Following established procedures to obtain approval to rectify non-compliance aspects of the switchboard.

C Carrying out preparation work effectively.

D Rectifying compliance defects.

E Placing and securing metering correctly.

F Making power and communications connections in accordance with manufacture's specifications and functional and regulatory requirements.

G Setting meter parameters in accordance with manufacture's specifications and functional and regulatory requirements.

H Reinstating supply to the installation safely.

I Documenting metering and rectification work and notifying appropriate persons in accordance with established procedures.

J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry

EVIDENCE GUIDE

	simulation policy. The resources used for assessment should reflect current industry practices in relation to installing and setting up interval metering.
Method of assessment	**9.4)** This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5)** There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the installation of at least:

- a single phase interval meter
- a two-way interval meter
- an interval meter where compliance rectification work is required

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

UEENEEH102A Repairs basic electronic apparatus faults by replacement of components

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit deals the replacement of electronic components, cabling and sub systems of electronic apparatus. It encompasses safe working practices, following written and oral instruction and procedures, basic testing and techniques, dismantling and assembling apparatus and disconnecting and reconnecting components.

Application of the Unit

Application of the Unit **2)**

This unit may apply to persons entering work in electro technology and may be used in school based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

License to practice **3)**

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to repair electronic apparatus.	1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
	1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
	1.3 The nature of the repair is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
	1.5 Sources of materials that may be required for the work are established in accordance with established routines and procedures.
	1.6 Tools, apparatus and testing devices needed

ELEMENT	PERFORMANCE CRITERIA	
		to carry out the work are obtained and checked for correct operation and safety.
2 Repair electronic apparatus.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits/apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Apparatus is dismantled in accordance with manufacturer's guide and supervisor's instructions.
	2.5	Component parts are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage.
	2.6	Repairs are affected efficiently without damage to other components, apparatus or circuits.
	2.7	Apparatus is assembled in an appropriate sequence with all components parts placed, secured and connected in accordance with manufacturer's guide or industry practice.
	2.8	Procedures for referring non-routine events to immediate supervisor for directions are followed.
	2.9	Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3 Complete and report repair work activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Repaired apparatus is prepared and forwarded to appropriate person(s) for

ELEMENT	PERFORMANCE CRITERIA
	testing.
	3.3 Work area is cleaned and made safe in accordance with established procedures.
	3.4 Work supervisor is notified of the completion of the repair work in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out basic repairs to electronic apparatus by replacement of components.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH102A Component replacement to repair basic electronic apparatus faults

Evidence shall show an understanding of component replacement to repair basic electronic apparatus faults, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Electronic soldering equipment and techniques

- Workshop hazards and safety associated with soldering
- Quality concepts
- Electronic soldering equipment
- The soldering process
- Lead free solder

T2. Printed circuit board soldering techniques

- Electronic component mounting
- Solder rework of printed circuit boards.
- Faulty solder joints

T3. Soldering electronic cables

- Soldering multi-strand, ribbon and coaxial cables
- Effects and prevention of electrostatic discharge (ESD)

T4. Electronic component basics

REQUIRED SKILLS AND KNOWLEDGE

- Types of components
- The physical features and primary characteristic of components
- Marking and codes on components
- Handling static sensitive components

T5. Electronic cable overview and coaxial cable

- Coaxial cables types and characteristics
- Coaxial cable termination

T6. Performance copper cables

- Twisted pair voice and data cables
- Insulation displacement (IDC) termination
- Colour codes
- Terminating performance cables
- Harness wiring

T7. Electronic apparatus components

- Fault finding
- Testing
- Replacement

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package. .

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must

include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Carry out basic repairs to electronic apparatus by replacement of components as described in 8) and including:

A Following manufacturer service instructions for access to components.

B Removing at least three different types of components specified in the work instructions.

C Replacing components to manufacturer requirements.

D Terminating correctly electronic cables using solderless termination techniques

E De-soldering and soldering to a high reliability standard and without damage to components.

F Reassembling the apparatus correctly.

G Testing apparatus operation.

H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note: Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to carrying out basic repairs to electronic apparatus by replacement of components.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out basic repairs electronic apparatus limited to replacement or repair of components, including sub systems in which the fault has been previously established.

At least two of the repairs shall require soldering and desoldering and at least two of the repairs shall require a cable to be correctly terminated using a solderless termination technique.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electronics

UEENEEH112A Troubleshoot digital sub-systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers determining correct operation of digital sub-systems. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in digital components circuits.

Application of the Unit

Application of the Unit **2)**

This competency standard unit is intended for development of competency in either entry-level employment based programs incorporated in approved contracts of training or other approved training programs. It may also be used to augment formally acquired competencies.

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other

License to practice **3)**

conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEH102A	Repair basic electronic apparatus faults by replacement of components

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to troubleshoot digital sub-systems.	1.1 OHS procedures for a given work area are obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

ELEMENT	PERFORMANCE CRITERIA	
	1.4	Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
	1.5	Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Troubleshoot digital sub-systems.	2.1	OHS risk control work measures and procedures are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Fault finding is approached methodically drawing on knowledge of digital components using measured and calculated values of parameters.
	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Fault finding activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3 Complete work and document troubleshooting activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to troubleshooting problems is documented.

ELEMENT	PERFORMANCE CRITERIA
	3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and troubleshooting digital subsystems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH112A Digital sub-system

Evidence shall show an understanding of digital sub-system troubleshooting, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Analogue and digital signals

- Comparison between analogue and digital signals
- Observing digital and analogue waveforms

T2. Numbering systems

- The binary number system
- The hexadecimal number system
- Binary addition and subtraction

T3. Numbering systems - conversions

- Conversion between numbering systems
- Binary Coded Decimal (BCD)
- Gray code
- The American Standard Code for Information Interchange (ASCII)
- Unicode

T4. Combinational logic circuits

- Precautions when handling electronic devices due to electrostatic discharge (ESD)
- Truth tables
- Basic operation and characteristics of logic gates
- Logic probes

REQUIRED SKILLS AND KNOWLEDGE

- Verification of operation of logic circuits

T5. Digital displays

- Seven segment LED displays
- Drive requirements
- Current limiting
- Multiplexed displays
- Seven segment Decoders
- Liquid Crystal Displays (LCD)
- Emerging display technologies
- Verification of seven segment display circuit
- Interfacing with logic circuits

T6. Digital subsystem building blocks

- Encoders and Decoders
- Multiplexers and Demultiplexers
- Timing diagrams
- Flip flops, Latches and registers
- Ripple counters
- MOD counters
- Synchronous counters Multi-vibrators
- Clocks
- Verification and operation (eg. PLDs, ICs)

T7. Digital fault finding

- General fault finding principles
- Common digital faults
- Digital test equipment
- Digital test equipment (eg. Logic probes, Digital Oscilloscopes, digital trainers)

T8. Logic families and specifications

- Input and output voltage characteristics
- Comparison of logic families
- Unit load
- Noise margin
- Interfacing different logic families
- Tri-state logic devices

Overview and applications of A/D converter and D/A converter

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package. .

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Troubleshoot digital subsystems as described in 8) and including:

A	Using methodical problem solving methods.
B	Taking measurements correctly and accurately.
C	Calculating parameters correctly and accurately.

D	Providing solution to digital component/circuit problems.
E	Providing written justification for the solutions to problems.
F	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are

assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

The resources used for assessment should reflect current industry practices in relation to troubleshooting digital subsystems.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH 102A	Repair basic electronic apparatus faults by replacement of components
UEENEEH 116A	Find and repair microwave amplifier section faults of electronic apparatus
UEENEEH 139A	Troubleshoot basic amplifier circuits

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to troubleshooting a digital subsystem with at least three types of basic digital components/circuits or functions.

The troubleshooting must be demonstrated on three types of faults.

Notes:

1. The range of faults may include: open/shorted signal lines, output loading, input-to-input connections and clock-related faults.

RANGE STATEMENT

2. Troubleshooting may involve the alteration of an existing digital subsystem to comply with a specified function and operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electronics

UEENEEH139A Troubleshoot basic amplifier circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers determining correct operation of basic amplifier circuits. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in basic amplifier circuits.

Application of the Unit

Application of the Unit **2)**

This competency standard unit is intended for development of competency in either entry-level employment based programs incorporated in approved contracts of training or other approved training programs. It may also be used to augment formally acquired competencies.

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 3 level or higher.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace provided equipment is not connected to installation wiring at

License to practice **3)**

voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH102A	Repair basic electronic apparatus faults by replacement of components

AND

UEENEEH114A	Troubleshoot resonance circuits in an electronic apparatus

OR

UEENEEG1	Solve problems in low voltage a.c. circuits

Prerequisite Unit(s) **4)**

02A

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to troubleshoot basic	1.1 OHS procedures for a given work area are

ELEMENT	PERFORMANCE CRITERIA	
amplifiers.		obtained and understood.
	1.2	OHS risk control work preparation measures and procedures are followed.
	1.3	The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4	Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
	1.5	Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve basic amplifier circuit problems.	2.1	OHS risk control work measures and procedures are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Fault finding is approached methodically drawing on knowledge of basic amplifiers using measured and calculated values of parameters.
	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Fault finding activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.

ELEMENT	PERFORMANCE CRITERIA
3 Complete work and document problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to troubleshooting problems is documented.
	3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and troubleshooting basic amplifiers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH139A Basic amplifier circuit troubleshooting

Evidence shall show an understanding of basic amplifier circuit troubleshooting, applying safe working practices and relevant Standards Codes and Regulations to an extent indicated by the following aspects:

T1. Introduction to Amplifiers

- Purpose of amplifiers
- Introduction to black box model of amplifier
- Decibels, engineering terms and formulae
- Measurement of gain and frequency response

T2. Amplifier Terminal Characteristics

- Amplifier types and transfer characteristics
- Ideal amplifier transfer characteristics

T3. Practical amplifiers

- Practical amplifier terminal characteristics
- Input and output resistance calculations based on voltage measurements

REQUIRED SKILLS AND KNOWLEDGE

T4. Operational amplifiers - Introduction

- Advantages of operational amplifiers
- Schematic symbol
- Open loop configuration
- Input and output resistance
- Gain bandwidth product
- Open loop amplifier operation
- Comparator circuit
- Circuit verification of operational amplifier configured as a comparator

T5. Operational amplifiers – Inverting Amplifier

- The need for and effects of negative feedback
- Inverting operational amplifier circuit configuration
- Inverting operational amplifier gain calculations
- Summing inverting operational amplifier gain calculations
- Circuit verification of operational amplifier gain

T6. Operational amplifiers – Non-inverting amplifier

- Non-inverting operational amplifier circuit configuration
- Non-inverting operational amplifier gain calculations
- Circuit verification of non inverting operational amplifier gain
- Voltage follower circuit configuration
- Voltage follower circuit gain
- Circuit verification of voltage follower

T7. Operational amplifiers – Differential Amplifier

- The differential amplifier
- Schematic circuit of differential amplifier using an operational amplifier
- Differential amplifier gain calculations
- Circuit verification of differential amplifier operation
- The Schmitt trigger
- Circuit verification of Schmitt trigger circuit

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package. .

EVIDENCE GUIDE

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to **9.2)**

demonstrate competency in this unit

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Troubleshoot basic amplifiers as described in 8) and including:

A Using methodical problem solving methods.

B Taking measurements correctly and accurately.

C Calculating parameters correctly and accurately.

D Providing solution to amplifier circuit problems.

E Providing written justification for the solutions to problems.

F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions

incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to troubleshooting basic amplifiers.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential

knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to troubleshooting amplifiers for at least three types of amplifier configurations.

The troubleshooting must be demonstrated on three types of faults.

Note:

1. The range of faults may include: distortion, excessive power consumption, low gain and limited frequency responses.

2. Troubleshooting may involve the modification of an existing amplifier configuration to comply with a specified function and operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electronics

UEENEEI155A Develop structured programs to control external devices

Modification History

		UEENEEI155A	Develop structured programs to control external devices	
Release	Action	Core/Elective	Details	Points
2	Editorial	N/A	In Pre-requisites, delete "For the full prerequisite chain details for this unit please refer to Table 2 in Volume 1, Part 2".	
2	Editorial	N/A	In Required Skills and Knowledge, insert topic numbering.	
2	Editorial	N/A	Replace "essential knowledge and associated skills" with "required skills and knowledge".	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This competency standard unit covers programming of microprocessor/microcontroller devices to access external devices. The unit encompasses working safely, applying knowledge of control applications, and analogue and digital input/output signals, programming fundamentals, writing and testing program and documenting programming activities.

Application of the Unit

Application of the Unit

2)

This competency standard unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships and the like.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading	5	Writing	5	Numeracy	5

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to develop structured programs for control sub systems.	1.1	OHS processes and procedures for a given work area are obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	The extent of structure programming to be developed is determined from job performance specifications and in consultations with relevant persons.
	1.4	Activities are planned to meet scheduled timelines in consultation with others involved on the work.
	1.5	Appropriate development kit and software are selected based on specified requirements and performance standard.
	1.6	Strategies are implemented to ensure programming is carried out efficiently.

ELEMENT	PERFORMANCE CRITERIA	
2 Develop structured programs for control sub systems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Knowledge of computer functions and features are applied to developing structure program.
	2.3	Correct structure and syntax is applied to developing structure program.
	2.4	Key features of the programming language are applied to develop and test solutions. (Note)
	2.5	Approaches to issues/problems are analysed to provide most effective solutions.
	2.6	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards
3 Test and document structured program for control subsystems.	3.1	Testing procedures are developed to test developed program.
	3.2	Problems and bugs in program are rectified to ensure specification the creation of the code is met.
	3.3	Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person or persons.

Note:

Although programming in 'C' is preferred any other structured language in current use by industry may be used.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the required skills and knowledge and their level, required for this

REQUIRED SKILLS AND KNOWLEDGE

unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing structured programs to control external devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EI155A Control programming fundamentals

Evidence shall show an understanding of control programming fundamentals to an extent indicated by the following aspects:

T1. Control applications of software

T2. Software terminology

T3. Programming languages currently used by industry

T4. Program development - flowcharts, pseudocode, algorithms

T5. Programming concepts encompassing:

- programming structure
- documentation
- compiling source code
- generating executable files
- scalar and structured data types
- constants and variables
- reading from keyboard and writing to screen
- arithmetic, relational and logical operations
- making decisions
- looping operations
- programming to access external devices via I/O boards
- functions - macros;
- global and local variables, auto and static variables;
- Intrinsic functions used in control;
- Writing functions;
- Linking in external functions to control hardware
- numerical and character arrays

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the

EVIDENCE GUIDE

unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects **9.2)**

of evidence required to demonstrate competency in this unit

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UEE11". Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
  - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
  - Demonstrate an understanding of the required knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements; and
  - Demonstrate an appropriate level of skills enabling employment; and
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - developing structured programs to control external devices as described in 8) and including:

A Using key features of an appropriate programming language.

B Developing testing procedures.

C Identifying problem and bugs in program.

D Rectifying problem and bugs in program.

E Writing and presenting relevant documentation to an acceptable standard.

F Dealing with unplanned events by drawing on required knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to developing structured programs to control external devices.

Method of assessment **9.4)**

This competency standard unit shall be assessed by methods given

in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the required knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to developing structured programs to control external devices for a given representative range of programs and control devices with the following attributes:

- safe working practices
- control applications knowledge application
- analogue and digital input/output signals
- programming
- program writing and testing
- programming activities documentation

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Instrumentation and Control

UEENEEI156A Develop and test code for microcontroller devices

Modification History

		UEENEEI156A	Develop and test code for microcontroller devices	
Release	Action	Core/Elective	Details	Points
2	Editorial	N/A	In Pre-requisites, delete "For the full prerequisite chain details for this unit please refer to Table 2 in Volume 1, Part 2".	
2	Editorial	N/A	In Required Skills and Knowledge, insert topic numbering.	
2	Editorial	N/A	Replace "essential knowledge and associated skills" with "required skills and knowledge".	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This competency standard unit covers structured programming instructions for micro devices at a fundamental level. The unit encompasses working safely, applying knowledge device architecture and programming fundamentals, writing and testing specified instructions and documenting development activities.

Note.

In this unit the term 'micro' refers to microcontrollers however competency in the unit can be achieved using microprocessors.

Application of the Unit

Application of the Unit

2)

This competency standard unit is intended to apply to any recognised development program that leads to the

acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships and the like.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to develop and test basic specifications.	1.1 OHS processes and procedures for a given work area are obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 The extent of specifications to be developed is determined from job performance requirements and in consultations with relevant persons.
	1.4 Activities are planned to meet scheduled timelines in consultation with others involved on the work.
	1.5 Appropriate development kit and software are selected based on specified requirements and performance standard.
	1.6 Strategies are implemented to ensure programming is carried out efficiently.

ELEMENT	PERFORMANCE CRITERIA
2 Develop basic specification.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of micro controller functions and features are applied to developing specifications.
	2.3 Correct structure and syntax is applied to developing program specification for target micro controller function.
	2.4 Key features of the assembler programming language are applied to develop and test solutions.
	2.5 Approaches to issues/problems are analysed to provide most effective solutions.
	2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.
3 Test and document the basic specification.	3.1 Testing procedures are developed to analyse code developed.
	3.2 Problems and bugs are rectified to ensure specification the creation of the code is met.
	3.3 Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person or persons.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the required skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing and testing code for microcontroller devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

REQUIRED SKILLS AND KNOWLEDGE

KS01-EI156A Microcontroller programming

Evidence shall show an understanding of microcontroller control system programming methods to an extent indicated by the following aspects:

T1 Microcontroller architecture encompassing:

- Program storage types
- Data storage types
- I/O Ports: analogue/ digital
- Integrated Peripherals: timers, interrupts etc
- Control circuitry: system clock, reset etc

T2. Programmer's model encompassing:

- Industry standard programming environment

T3. Programming terms encompassing:

- Language levels and their features
- Language simulators and emulators

T4. Language programming basics encompassing:

- Programming input/output functions
- Input/output port programming
- Structured assembly programming
- Timing loops

T5. Memory organisation, operation and addressing methods encompassing:

- register structure
- instruction register/decoder
- arithmetic logic unit (ALU)
- accumulator and flags
- instruction cycle timing
- control lines
- stack pointer
- index register

T6. System clock circuits fetch and execute encompassing:

- timing cycle
- timing relationship to system clock
- logic levels of system buses for each clock period of an instruction cycle

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UEE11". Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
  - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
  - Demonstrate an understanding of the required knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.; and
  - Demonstrate an appropriate level of skills enabling employment; and
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Develop and test code for microcontroller devices as described in 8) and including:

A Using all key features of an appropriate assembler language.

B Developing testing procedures.

C	Identifying problem and bugs in program.
D	Rectifying problem and bugs in program.
E	Writing and presenting work reports to an acceptable standard.
F	Dealing with unplanned events by drawing on required knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to developing and testing code for microcontroller devices.

Method of assessment

9.4)

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified required knowledge and skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to developing and testing code for microcontroller devices including at least three of the following:

- Selecting an appropriate micro for a given task
- Setting up and using basic input/output functions
- Using assembler/simulator software packages to debug program
- Finding system faults.

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Instrumentation and Control

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This competency standard unit requires the worker to undertake methods of work practice that minimises energy and material usage and to seek energy reduction strategies in the energy sector workplace. The unit seeks to minimise negative impacts on the environment.

Application of the Unit

Application of the Unit **2)**

This competency standards unit shall apply to persons entering work in energy sector and may be used in school based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practice in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships and the like.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work

License to practice **3)**

platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus, site rehabilitation and the like.

2. Compliance may be required in various jurisdictions relating to currency in first aid, confined space, lifting, risk safety measure and the like

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

There are no prerequisite competencies for this unit

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and maths skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and prepare to apply sustainable work practice	1.1 Activities are planned and prepared for to ensure OHS policies and procedures are followed with the work appropriately sequenced in accordance with requirements
	1.2 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved
	1.3 Materials are obtained and checked in accordance with established procedures and to comply with requirements
	1.4 Location in which activities are to be undertaken is determined from requirements
	1.5 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements
	1.6 Workplace environmental risks and resource efficiency issues are identified
2 Apply sustainable work practice	2.1 OHS policies and procedures for undertaking administrative functions are followed
	2.2 Activities are undertaken in accordance with requirements to implement techniques which produce energy reduction directly or indirectly
	2.3 Unplanned events or conditions are responded to in accordance with established procedures
	2.4 Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are

ELEMENT	PERFORMANCE CRITERIA	
		implemented
	2.5	On-going checks of the quality of the work are undertaken in accordance with established procedures
	2.6	Work is carried out efficiently without unnecessary waste of materials or damage to the surrounding environment, while using sustainable work practices which minimise wastage of energy and materials either directly or indirectly
3 Complete the application of sustainable work practice	3.1	Documentation/reports are completed to ensure detailed promotional activities requirements are met
	3.2	Suggestions are made for improvements to workplace practices to minimise energy and materials wastage
	3.3	Completion is notified in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying environmentally and sustainable work practices in the energy sector.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK142A Environmentally and sustainable work practice

Evidence shall show an understanding of environmentally and sustainable work practices to an extent indicated by the following aspects:

T1 Sustainable work practices encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Notion of sustainable work practice
- Effects of neglecting sustainable work practice
- The greenhouse effect - causes, consequences.
- International and national greenhouse imperatives.
- The role of regulators and similar bodies
- Legislative requirements
- Economic benefits of sustainable initiatives.

T2 Techniques for reducing carbon produced energy and hence greenhouse gases encompassing:

- domestic, commercial and industrial strategies
- trade related technologies and methods
- energy efficient retrofits (overview).
- renewable energy technologies (overview)

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitude competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

The evidence on which competency in this unit is based shall be considered holistically for each element on at least two occasions comprising:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
  - Apply sustainable work practice principles and practices as specified in the performance criteria and range; and
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements. and
  - Demonstrate an appropriate level of skills enabling employment; and
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in environmentally sustainable work practices as listed in the Range statement' and including:

A Apply sustainable work practice in daily work activities

B Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency in participating in environmentally sustainable work practices.

Method of assessment **9.4)**

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent **9.5)**

assessment and relationship with other units

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to participating in environmentally sustainable work practices in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electronics
- Fire protection
- Instrumentation and control
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy

UEENEER001B Contribute to the planning of a research project

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the ability to gather background information relevant to a research project, understand the context of the research project and contribute to the development of a research plan to achieve quality outcomes.

Application of the Unit

Application of the Unit **4)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Acquire and understand background information relevant to the Research project.	1.1	Information sources about the research topic are identified and evaluated for reliability and validity.
	1.2	Information about the consumer, product, market and competition is collected, reviewed and understood.
	1.3	Key clients/stakeholders, their views and interests, are identified and recorded.

ELEMENT	PERFORMANCE CRITERIA	
	1.4	The context (industrial, legal, ethical, political) of the research project is identified and understood.
2 Understand the Logistics of a Research Project.	2.1	Client, stakeholder and organisational requirements are identified and understood.
	2.2	Contractual obligations of the project are identified and understood.
	2.3	Resources available to support the project are identified and understood.
	2.4	Quality standards for the project are identified and understood.
3 Contribute to the planning of a Research Project	3.1	Project objectives, methodology and strategies appropriate to the requirements and contractual obligations of the project are identified and selected, in a team environment.
	3.2	Project phases, milestones, reporting and review points are identified, in a team environment.
	3.3	Criteria for evaluating each project deliverable against pre-defined quality standards are developed, in a team environment.
	3.4	A Research Plan is developed, in a team environment.
4 Seek endorsement and ensure distribution of a Research Project Plan	4.1	The draft Research Plan is forwarded to clients/stakeholders/appropriate personnel for perusal and comment.
	4.2	The draft Research Plan is amended to incorporate recommended improvements from clients/stakeholders/appropriate personnel.
	4.3	The final Research Plan is confirmed against overall project deliverables by appropriate personnel.
	4.4	The final Research Plan is distributed to all appropriate personnel and team members.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contribute to the planning of a research project.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER001B Research project planning

Evidence shall show that knowledge has been acquired of safe working practices and contribute to the planning of a research project.

T1 Project planning encompassing:

- Purpose of project planning
- Documents needed to plan a project
- Factors influencing sequence and restraints of project activities
- Critical path analysis encompassing:
  - Graphical representation methods
  - Methods of representing time/rates

T2 Project management encompassing:

- Defining project parameters - Project scope; Project stakeholders and clients; Project phases and the relationship between phases; Time requirements and limitations; Resource requirements and limitations; Quality requirements and limitations.
- Time management - time management concepts; standard practices for ensuring a project runs to time and the like.
- Financial management - Financial management concepts; Standard practices for managing project finances; Project budgets; Costs, variations and estimations; Invoicing against project phases/deliverables; Acquittals and the like.
- Quality management - Quality management concepts; Standard practices for managing quality within a project.
- Human Resource management - human resource management concepts; standard practices for managing personnel within a project
- Communication management - Communication management concepts; Standard practices for managing communication within a project and the like.
- Risk management and contingencies - risk management concepts; standard practices for managing risk within a project; Internal risks; External risks; Risk minimisation; Risk removal; Contingencies and the like.
- Procurement management - procurement management concepts; standard practices

REQUIRED SKILLS AND KNOWLEDGE

for managing procurement and the like.

- Physical Resource management - Types of physical resource, including; Equipment, Technology, Information, Facilities; Physical resource management concepts; Standard practices for managing physical resources
- Contracts - Understanding project contracts; Standard practices for working to contract specifications; Contract format; Contract content; Legal obligations of contract parties; Accompanying documentation including; Contract Schedules and the like.
- Performance assessment and continuous improvement - standard performance assessment practices; standard continuous improvement practices and the like
- Engineering ethics principles

T3 Research concepts encompassing:

- Terminology - Terminology used in a research workplace; Terminology used in research-specific literature and the like.
- Theory – why conduct research, The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.
- The research environment - The research work environment; Standard research practices; Industrial, legal, ethical, political and market environment considerations; Legislation and regulation; Contractual obligations of all parties and the like.
- Planning to conduct research - Concept development and/or research brief analysis; Research objectives; Research deliverables; Research project plan; Literature reviews; Methodology development, including; Experimental design, Technology selection, Information Management system selection and the like
- Clients - Identifying client viewpoints and stake in project; Identifying client requirements and parameters; Determining research budgets, timelines, milestones and quality attributes with clients.
- Research, Development and Commercialisation - Research and Development goals versus Commercialisation goals and realities; Research and Development to inspire a commercialisation process.

T4 Work in a team encompassing:

- Types of teams - Managerial, Administrative, Project-based, Commercial and Social
- Roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management, clients and the like.
- Working in a team - Identification and utilisation of team member skills and knowledge; Maximising benefits of team diversity; Team planning; Team commitment and cooperation; Improving/Maximising team performance to achieve goals; Team monitoring and adjustment; Plain English literacy and communication; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with clients and the like.

REQUIRED SKILLS AND KNOWLEDGE

- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

T5 Scientific writing and communication encompassing:

- Types of scientific writing and communication - The distinguishing characteristics of the different types of scientific writing.
- Purpose of the different types of scientific writing - Product development justification and specifications; Management advice; Scientific papers/publications; Conference/meeting presentations; Policy documents; Planning documents; Reports and the like.
- Types of audience - The features and characteristics of an audience, including; an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'Plain English' written and oral communication.
- Scientific writing techniques - The component parts of scientific documents, including: Aim, Materials, Method, Results, Discussion, Conclusion, References; The required content of each component part; Scientific referencing techniques, including: Bibliographies, Reference Lists, Citations, Footnotes, Quotes, and Acknowledgements; Scientific labelling techniques, including: Graphs, Tables, Diagrams, and Figures; Techniques for documenting results, including: Text, Graphs, Tables, Diagrams, and Figures; Organisational standards for document and presentation production, including: Standard organisational document templates, letterheads, headers, footers, and logos.
- Oral communication techniques - Techniques for communicating to large groups, including; Conference presentations, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
- Electronic communication formats - World-wide Web – protocols and practices; Email – protocols and practices; Transfer of information via CD Rom/Floppy Disk; Use of PDF and other secure files.
- Confidentiality considerations - Confidentiality practices to protect the organisation; Confidentiality practices to protect the client; Confidentiality practices to protect providers of information/research cohorts.

T6 Data collection techniques encompassing:

- Data types - Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.
- Data Collection - Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, focus groups; Literature reviews, including; traditional and web-based; Group facilitation and presentation; Questioning, active listening and clarification; Obstacles to data collection, including; unavailable data, inconsistent data, confidentiality, security; Data limitations.
- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to

REQUIRED SKILLS AND KNOWLEDGE

research; Relevance to research objectives.

T7 Data analysis and presentation encompassing:

- Data analysis techniques - Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.
- Data analysis technique selection - Determining the correct analysis technique(s); Determining the correct sequence of analysis techniques; Accommodating influencing factors including research objectives, budget, timeline and quality requirements, data limitations, confidentiality, security and the like.
- Data interpretation - Determining results; determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.
- Data presentation:
  - Determining the correct form of presentation for the audience, including; colleagues, scientific community, marketing and commercialisation specialists, general community, industry, mixed (i.e. conference audience).
  - Forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams, electronic formats; Forms of verbal presentation, including meetings, client briefings, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

T8 Product development and trials encompassing:

- Identifying client and managerial requirements for production and trials - Required outcome(s); Key performance indicators; Timelines; Financing; Resources; Quality Assurance and the like.
- Influencing factors - Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements; Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like.
- Product development arrangements - Licensing agreements; Joint Ventures; Sole Ventures and the like.
- Relevant Documentation - Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- Development & trial processes - Proof of concept; Trialing concepts; Definitions/Specifications; Types of development and trial processes, including Phase A product and trial, Phase B product and trial, User trials, Ergonomics and Usability testing; Pre-defined acceptance criteria, confidence limits; Data collection & analysis; Production; Evaluation and recommendation formulation.

REQUIRED SKILLS AND KNOWLEDGE

T9 Intellectual property concepts encompassing:

- Intellectual Property and Australian Law - The place of Intellectual Property in Australian Law; Past cases and outcomes; Necessary considerations and the like.
- The nature of Intellectual Property - What is Intellectual Property? What isn't Intellectual Property?; Why is Intellectual Property relevant?; What can Intellectual Property rights do?; What can't Intellectual Property rights do?
- Intellectual Property Rights - Patents; Copyright; Designs; Confidential Information; Other specialty rights and the like.
- Managing Intellectual Property - Identifying Intellectual Property; Deciding what to protect; Strategies for managing Intellectual Property; How can Intellectual Property rights work together?; Intellectual Property versus time, effort, finances; Sources of Assistance, including Publications, Intellectual Property professionals, Lawyers, Business Advisors, Marketing consultants and the like.
- Enforcement of Intellectual Property - The enforcement process; The role of lawyers; Resolution.
- The changing face of Intellectual Property - Development of Intellectual Property Right Laws; Changes to Intellectual Property Right laws; Extensions of Intellectual Property Rights into non-traditional areas, including cultural, property arenas; The global marketplace and the like.

T10 Commercialisation concepts encompassing:

- Commercialisation - Definition of commercialisation; Triggers for commercialisation; Past commercialisation successes; Past commercialisation failures; Triggers for commercialisation; Methods for identifying a good product/idea/service/application; Sources of assistance in regard to commercialisation, including documents; lawyers, business advisors, marketing consultants.
- The commercialisation process - The concept; Does the concept fit with the organisation's goals? Is there a market, what is the market? Will the product meet the market requirements? Can the product be sold? How can the product be sold? Can the product be produced? How can the product be produced? Can the production be repeated?
- Commercialisation arrangements - sole venture; Joint venture; Licensing; Legal aspects of commercialisation.
- Commercialisation planning - Costing; Marketing; Production/development; Distribution; Sales.
- Competition - Who are the competitors? What are they doing and how quickly? Internal development relevant to competition.
- Critical analysis of the commercialisation process for continuous improvement - Successes; Opportunities for improvement; Controllable influences; Uncontrollable influences; Formulation of recommendations.

T11 Occupational Health and Safety principles and fundamentals encompassing:

- underlying principles of OH&S

REQUIRED SKILLS AND KNOWLEDGE

- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- employer and employee responsibilities, rights and obligations.
- major functions of safety committees and representatives.
- powers given to Occupational Health and Safety Inspectors
- housekeeping and potential hazards in relation to improper housekeeping
- selecting appropriate personal protective equipment (PPE) given hazardous situations

T12 The work environment encompassing:

- typical hazards associated with a range of work environments
- procedures used to control the risks associated with these hazards
- principles of risk assessment / management and state the purpose of each.
- hierarchy of OH&S hazard control measures.
- required documentation for risk assessment.
- commonly used workplace safety signs.
- workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation.
- appropriate fire extinguisher for a given type of fire.
- requirements for the location, mounting and maintenance of portable fire extinguishers.
- basic process of fighting a fire.
- safe premises, buildings and security are important in an industrial setting and the consequences of non- compliance with these.
- standard work procedure is and why they are required in some circumstances.

T13 Manual Handling encompassing:

- typical manual handling injuries and the effect they can have on lifestyle
- situations that may cause manual handling injuries
- correct procedures for lifting and carrying to prevent manual handling injuries
- Chemicals in the workplace encompassing:
- hazardous substances and dangerous goods.
- Classification of chemicals as hazardous substances and/or dangerous goods
- requirements for labelling of chemicals in the workplace
- safe storage procedures for chemicals
- purpose of and interpretation of material safety data sheet (MSDS)

T14 Working at heights encompassing:

- dangers associated with working on ladders and scaffolds
- identification of work area as a height risk and use appropriate safety equipment to prevent a fall
- selecting an appropriate ladder for a given situation and perform a safety check before use

REQUIRED SKILLS AND KNOWLEDGE

- precautions that should be taken when ascending and working off a ladder
- precautions that should be taken when working on and around a scaffold and elevated platforms.

T15 Confined spaces encompassing:

- hazards associated with working in a confined space
- identifying workplace situations that could be classified as a confined space
- control measures for working in a designated confined space

T16 Physical and psychological hazards encompassing:

- short and long term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
- effects of vibration on the human body and work practices to protect against vibration
- effects of thermal stress on the human body and work practices to protect against thermal stress
- effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation.
- dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger.
- occupational overuse syndrome, state examples of how it occurs and describe means to overcome it
- factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
- detrimental effects and dangers of drug and alcohol use in the workplace

T17 Working safely with electricity encompassing:

- effects of electric shock on the human body
- common causes of electrical accidents
- precautions that can minimise the chance of electric shock (earthing, extra low voltage, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

T18 Life support - CPR in the workplace encompassing:

- First Aid.
- responsibilities of the First Aider.
- priorities of first aid management for any accident or injury.
- procedures required at an accident scene.
- legal and ethical issues, which may impact on the management of care.
- 'Duty of Care'.
- examination of a casualty for injuries.

REQUIRED SKILLS AND KNOWLEDGE

- effect of cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (CPR).
- signs and symptoms of an altered level of consciousness
- management of simulation of a casualty with an altered level of consciousness.
- signs and symptoms of shock.
- management of simulation of a casualty in shock

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous

EVIDENCE GUIDE

substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items

EVIDENCE GUIDE

below:

- Contribute to the planning of a research project as described in 8) and including:

  A Demonstrating consistent performance for each Element of the unit

  B Meeting the performance criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace

  C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

Note:
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the planning of a research project.

EVIDENCE GUIDE

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A	Participate in, lead and facilitate work teams
UEENEER002B	Contribute to the conduct of a research project
UEENEER003B	Contribute to the development of a product/application/service
UEENEER004B	Contribute to the trial of a product/application/service
UEENEER005B	Contribute to intellectual property management
BSBCMN306A	Produce business documents
BSBSBM405A	Monitor and manage business operations
UEENEER00A	Contribute to the commercialisation of a product/application/service
PMBQUAL309A	Solve problems using 'quality tools'

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the planning of research projects. Typically this work is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. It generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources

The following constants and variables included in the Element/performance criteria in this unit are fully described in the Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5

Custom Content Section

Competency Field **5)**

Research

UEENEER002B Contribute to the conduct of a research project

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the ability to identify information sources and collect and analyse information in accordance with confirmed research project objectives and compile and present results in accordance with current business practices.

Application of the Unit

Application of the Unit **4)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Confirm research parameters	1.1	Consultation with appropriate personnel is undertaken to ensure that the scope, objectives and expected outcomes of the research are understood.
	1.2	Timeframes, available resources, budget and quality standards for the research are confirmed and understood.
	1.3	The research methodology and strategies are confirmed and understood.

ELEMENT	PERFORMANCE CRITERIA
2 Identify sources and availability of information	2.1 The type and range of information required is clearly identified to meet research objectives.
	2.2 Information sources are identified and evaluated for their contribution to the research.
	2.3 Protocols and other procedures required to access information are clearly identified and appropriate action taken.
	2.4 Limitations on the availability of material are identified and appropriate action taken.
	2.5 Obstacles to the collection of information are identified and appropriate action taken.
3 Collect information to achieve research objectives	3.1 Information collection methods are applied correctly and consistently, in accordance with appropriate procedures and agreements reached with information sources.
	3.2 The types and range of information collected are in line with the research objectives.
	3.3 Information is recorded accurately and clearly in an appropriate format.
4 Analyse and compile research information	4.1 Methods of analysis and compilation are appropriate to the information collected and objectives of the research.
	4.2 Methodologies and procedures incorporate current technological developments and meet relevant industry standards.
	4.3 Results are obtained within the specified time, budget and quality constraints.
	4.4 Results are recorded accurately and clearly in appropriate format.
	4.5 Results are carefully interpreted and conclusions drawn.
	4.6 The results and conclusions are reviewed with appropriate personnel.

ELEMENT	PERFORMANCE CRITERIA
5 Present research results and conclusions.	5.1 A report/summary/presentation detailing the research results and conclusions is developed in accordance with current business practices.
	5.2 Confidential information is protected in accordance with predefined agreements and/or procedures.
	5.3 All sources of information are accurately acknowledged or cited in a recognised and appropriate format.
	5.4 The success of the research methodology is evaluated against the research objectives.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the conduct of a research project.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER002B Conducting Research Projects

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the conducting of a research project.

T1 Project planning

- Purpose of project planning
- Documents needed to plan a project
- Factors influencing sequence and restraints of project activities
- Critical path analysis encompassing:
  - Graphical representation methods
  - Methods of representing time/rates

T2 Research concepts encompassing:

- Terminology - Terminology used in a research workplace; Terminology used in research-specific literature and the like.

REQUIRED SKILLS AND KNOWLEDGE

- Theory – why conduct research, The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.
- The research environment - The research work environment; Standard research practices; Industrial, legal, ethical, political and market environment considerations; Legislation and regulation; Contractual obligations of all parties and the like.
- Planning to conduct research - Concept development and/or research brief analysis; Research objectives; Research deliverables; Research project plan; Literature reviews; Methodology development, including; Experimental design, Technology selection, Information Management system selection and the like
- Clients - Identifying client viewpoints and stake in project; Identifying client requirements and parameters; Determining research budgets, timelines, milestones and quality attributes with clients.
- Research, Development and Commercialisation - Research and Development goals versus Commercialisation goals and realities; Research and Development to inspire a commercialisation process.

T3 Work in a team encompassing:

- Types of teams - Managerial, Administrative, Project-based, Commercial and Social
- Roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management, clients and the like.
- Working in a team - Identification and utilisation of team member skills and knowledge; Maximising benefits of team diversity; Team planning; Team commitment and cooperation; Improving/Maximising team performance to achieve goals; Team monitoring and adjustment; Plain English literacy and communication; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with clients and the like.
- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

T4 Scientific writing and communication encompassing:

- Types of scientific writing and communication - The distinguishing characteristics of the different types of scientific writing.
- Purpose of the different types of scientific writing - Product development justification and specifications; Management advice; Scientific papers/publications; Conference/meeting presentations; Policy documents; Planning documents; Reports and the like.
- Types of audience - The features and characteristics of an audience, including; an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'Plain English' written and oral communication.
- Scientific writing techniques - The component parts of scientific documents,

REQUIRED SKILLS AND KNOWLEDGE

including: Aim, Materials, Method, Results, Discussion, Conclusion, References; The required content of each component part; Scientific referencing techniques, including: Bibliographies, Reference Lists, Citations, Footnotes, Quotes, and Acknowledgements; Scientific labelling techniques, including: Graphs, Tables, Diagrams, and Figures; Techniques for documenting results, including: Text, Graphs, Tables, Diagrams, and Figures; Organisational standards for document and presentation production, including: Standard organisational document templates, letterheads, headers, footers, and logos.

- Oral communication techniques - Techniques for communicating to large groups, including; Conference presentations, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
- Electronic communication formats - World-wide Web – protocols and practices; Email – protocols and practices; Transfer of information via CD Rom/Floppy Disk; Use of PDF and other secure files.
- Confidentiality considerations - Confidentiality practices to protect the organisation; Confidentiality practices to protect the client; Confidentiality practices to protect providers of information/research cohorts.

T5 Data collection techniques encompassing:

- Data types - Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.
- Data Collection - Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, focus groups; Literature reviews, including; traditional and web-based; Group facilitation and presentation; Questioning, active listening and clarification; Obstacles to data collection, including; unavailable data, inconsistent data, confidentiality, security; Data limitations.
- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to research; Relevance to research objectives.

T6 Data analysis and presentation encompassing:

- Data analysis techniques - Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.
- Data analysis technique selection - Determining the correct analysis technique(s); Determining the correct sequence of analysis techniques; Accommodating influencing factors including research objectives, budget, timeline and quality requirements, data limitations, confidentiality, security and the like.
- Data interpretation - Determining results; determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.
- Data presentation:
  - Determining the correct form of presentation for the audience, including;

REQUIRED SKILLS AND KNOWLEDGE

colleagues, scientific community, marketing and commercialisation specialists, general community, industry, mixed (i.e. conference audience).

- Forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams, electronic formats; Forms of verbal presentation, including meetings, client briefings, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

T7 Product development and trials encompassing:

- Identifying client and managerial requirements for production and trials - Required outcome(s); Key performance indicators; Timelines; Financing; Resources; Quality Assurance and the like.
- Influencing factors - Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements; Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like.
- Product development arrangements - Licensing agreements; Joint Ventures; Sole Ventures and the like.
- Relevant Documentation - Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- Development & trial processes - Proof of concept; trialing concepts; Definitions/Specifications; Types of development and trial processes, including Phase A product and trial, Phase B product and trial, User trials, Ergonomics and Usability testing; Pre-defined acceptance criteria, confidence limits; Data collection & analysis; Production; Evaluation and recommendation formulation.

T8 Intellectual property concepts encompassing:

- Intellectual Property and Australian Law - The place of Intellectual Property in Australian Law; Past cases and outcomes; Necessary considerations and the like.
- The nature of Intellectual Property - What is Intellectual Property? What isn't Intellectual Property?; Why is Intellectual Property relevant?; What can Intellectual Property rights do?; What can't Intellectual Property rights do?
- Intellectual Property Rights - Patents; Copyright; Designs; Confidential Information; Other specialty rights and the like.
- Managing Intellectual Property - Identifying Intellectual Property; Deciding what to protect; Strategies for managing Intellectual Property; How can Intellectual Property rights work together?; Intellectual Property versus time, effort, finances; Sources of Assistance, including Publications, Intellectual Property professionals, Lawyers, Business Advisors, Marketing consultants and the like.
- Enforcement of Intellectual Property - The enforcement process; The role of

REQUIRED SKILLS AND KNOWLEDGE

lawyers; Resolution.

- The changing face of Intellectual Property - Development of Intellectual Property Right Laws; Changes to Intellectual Property Right laws; Extensions of Intellectual Property Rights into non-traditional areas, including cultural, property arenas; The global marketplace and the like.

T9 Occupational Health and Safety principles and fundamentals encompassing:

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- employer and employee responsibilities, rights and obligations.
- major functions of safety committees and representatives.
- powers given to Occupational Health and Safety Inspectors
- housekeeping and potential hazards in relation to improper housekeeping
- selecting appropriate personal protective equipment (PPE) given hazardous situations

T10 The work environment encompassing:

- typical hazards associated with a range of work environments
- procedures used to control the risks associated with these hazards
- principles of risk assessment / management and state the purpose of each.
- hierarchy of OH&S hazard control measures.
- required documentation for risk assessment.
- commonly used workplace safety signs.
- workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation.
- appropriate fire extinguisher for a given type of fire.
- requirements for the location, mounting and maintenance of portable fire extinguishers.
- basic process of fighting a fire.
- safe premises, buildings and security are important in an industrial setting and the consequences of non- compliance with these.
- standard work procedure is and why they are required in some circumstances.

T11 Manual Handling encompassing:

- typical manual handling injuries and the effect they can have on lifestyle
- situations that may cause manual handling injuries
- correct procedures for lifting and carrying to prevent manual handling injuries
- Chemicals in the workplace encompassing:
- hazardous substances and dangerous goods.
- Classification of chemicals as hazardous substances and/or dangerous goods
- requirements for labelling of chemicals in the workplace
- safe storage procedures for chemicals

REQUIRED SKILLS AND KNOWLEDGE

- purpose of and interpretation of material safety data sheet (MSDS)

T12 Working at heights encompassing:

- dangers associated with working on ladders and scaffolds
- identification of work area as a height risk and use appropriate safety equipment to prevent a fall
- selecting an appropriate ladder for a given situation and perform a safety check before use
- precautions that should be taken when ascending and working off a ladder
- precautions that should be taken when working on and around a scaffold and elevated platforms.

T13 Confined spaces encompassing:

- hazards associated with working in a confined space
- identifying workplace situations that could be classified as a confined space
- control measures for working in a designated confined space

T14 Physical and psychological hazards encompassing:

- short and long term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
- effects of vibration on the human body and work practices to protect against vibration
- effects of thermal stress on the human body and work practices to protect against thermal stress
- effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation.
- dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger.
- occupational overuse syndrome, state examples of how it occurs and describe means to overcome it
- factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
- detrimental effects and dangers of drug and alcohol use in the workplace

T15 Working safely with electricity encompassing:

- effects of electric shock on the human body
- common causes of electrical accidents
- precautions that can minimise the chance of electric shock (earthing, extra low voltage, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

REQUIRED SKILLS AND KNOWLEDGE

T16 Life support - CPR in the workplace encompassing:

- First Aid.
- responsibilities of the First Aider.
- priorities of first aid management for any accident or injury.
- procedures required at an accident scene.
- legal and ethical issues, which may impact on the management of care.
- 'Duty of Care'.
- examination of a casualty for injuries.
- effect of cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (CPR).
- signs and symptoms of an altered level of consciousness
- management of simulation of a casualty with an altered level of consciousness.
- signs and symptoms of shock.
- management of simulation of a casualty in shock

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in

EVIDENCE GUIDE

accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs

EVIDENCE GUIDE

provide a percentile graded result for the purpose of regulatory or licensing requirements.

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Contribute to the conduct of a research project as described in 8) and including:

    A Demonstrating consistent performance for each Element of the unit

    B Meeting the performance criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace

    C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

Note:
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

EVIDENCE GUIDE

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the conduct of a research project.

Method of assessment

9.4)

This unit shall be assessed by methods outlined in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A	Participate in, lead and facilitate work teams
UEENEER001B	Contribute to the planning of a research project
UEENEER003B	Contribute to the development of a product/application/service
UEENEER004B	Contribute to the trial of a product/application/service
UEENEER005B	Contribute to intellectual property management
BSBCMN306A	Produce business documents
BSBSBM405A	Monitor and manage business operations
UEENEER006B	Contribute to the commercialisation of a product/application/service

EVIDENCE GUIDE

PMBQUAL309 Solve problems using 'quality tools' A

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the planning of research projects. Typically this work is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. It generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5**)

Research

UEENEER003B Contribute to the development of a product/application/ service

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the ability to assist managers to plan, coordinate and report on the development of a product/application/service.

Application of the Unit

Application of the Unit **4)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Contribute to the development of a design brief for a product/service/application.	1.1 Technical specifications, regulatory, industrial, intellectual property and market requirements of the product/application/service to be developed are negotiated with client(s), stakeholders and management and agreed on.
	1.2 Technical specifications, regulatory, industrial, intellectual property and market requirements of the product/application/service to be developed are confirmed.

ELEMENT	PERFORMANCE CRITERIA	
	1.3	Resource requirements, including personnel, equipment and materials needed to develop the product/application/service area confirmed.
	1.4	Quality requirements and standards for development of the product/application/service are confirmed.
	1.5	A design brief for the product/application/service is developed in a team environment.
	1.6	Approval is obtained for the design brief from appropriate personnel.
2 Prepare to develop a product/application/service	2.1	The required outcome(s) as identified in design brief is confirmed with appropriate personnel.
	2.2	The product/application/service is developed in consultation with appropriate production personnel.
	2.3	A development procedure is formulated to: - deliver required quality outcome(s) - ensure OHS, environmental, industrial and regulatory requirements are stringently observed - ensure tooling, process, materials and equipment specifications are addressed
	2.4	Approval is obtained of the development procedure from appropriate personnel.
3 Contribute to the development of a product/application/service	3.1	The development procedure is confirmed with appropriate personnel.
	3.2	A product/application/ service product is developed in accordance with the design brief and development procedure.
	3.3	Development results are recorded in accordance with enterprise procedures.
	3.4	Develop results and identify characteristics which are outside design and development specifications are identified.

ELEMENT	PERFORMANCE CRITERIA	
	3.5	Changes are recommended, as necessary, to achieve product/application/ service quality and production requirements.
	3.6	Approval of changes is obtained from appropriate personnel.
	3.7	Revision of the product/ application/service to achieve quality and production requirements is coordinated where necessary.
4 Document and report product/application/service development outcomes	4.1	All product/application/service development objectives are met.
	4.2	Product/application/service development reporting requirements are completed.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the development of a product/application/service.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER003B Product/application/service development

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the development of a product/application/service.

T1 Project planning

- Purpose of project planning
- Documents needed to plan a project
- Factors influencing sequence and restraints of project activities
- Critical path analysis encompassing:
  - Graphical representation methods
  - Methods of representing time/rates

T2 Project management encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Defining project parameters - Project scope; Project stakeholders and clients; Project phases and the relationship between phases; Time requirements and limitations; Resource requirements and limitations; Quality requirements and limitations.
- Time management - time management concepts; standard practices for ensuring a project runs to time and the like.
- Financial management - Financial management concepts; Standard practices for managing project finances; Project budgets; Costs, variations and estimations; Invoicing against project phases/deliverables; Acquittals and the like.
- Quality management - Quality management concepts; Standard practices for managing quality within a project.
- Human Resource management - human resource management concepts; standard practices for managing personnel within a project
- Communication management - Communication management concepts; Standard practices for managing communication within a project and the like.
- Risk management and contingencies - risk management concepts; standard practices for managing risk within a project; Internal risks; External risks; Risk minimisation; Risk removal; Contingencies and the like.
- Procurement management - procurement management concepts; standard practices for managing procurement and the like.
- Physical Resource management - Types of physical resource, including; Equipment, Technology, Information, Facilities; Physical resource management concepts; Standard practices for managing physical resources
- Contracts - Understanding project contracts; Standard practices for working to contract specifications; Contract format; Contract content; Legal obligations of contract parties; Accompanying documentation including; Contract Schedules and the like.
- Performance assessment and continuous improvement - standard performance assessment practices; standard continuous improvement practices and the like
- Engineering ethics principles

T3 Work in a team encompassing:

- Types of teams - Managerial, Administrative, Project-based, Commercial and Social
- Roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management, clients and the like.
- Working in a team - Identification and utilisation of team member skills and knowledge; Maximising benefits of team diversity; Team planning; Team commitment and cooperation; Improving/Maximising team performance to achieve goals; Team monitoring and adjustment; Plain English literacy and communication; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with clients and the like.

REQUIRED SKILLS AND KNOWLEDGE

- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

T4 Scientific writing and communication encompassing:

- Types of scientific writing and communication - The distinguishing characteristics of the different types of scientific writing.
- Purpose of the different types of scientific writing - Product development justification and specifications; Management advice; Scientific papers/publications; Conference/meeting presentations; Policy documents; Planning documents; Reports and the like.
- Types of audience - The features and characteristics of an audience, including; an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'Plain English' written and oral communication.
- Scientific writing techniques - The component parts of scientific documents, including: Aim, Materials, Method, Results, Discussion, Conclusion, References; The required content of each component part; Scientific referencing techniques, including: Bibliographies, Reference Lists, Citations, Footnotes, Quotes, and Acknowledgements; Scientific labelling techniques, including: Graphs, Tables, Diagrams, and Figures; Techniques for documenting results, including: Text, Graphs, Tables, Diagrams, and Figures; Organisational standards for document and presentation production, including: Standard organisational document templates, letterheads, headers, footers, and logos.
- Oral communication techniques - Techniques for communicating to large groups, including; Conference presentations, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
- Electronic communication formats - World-wide Web – protocols and practices; Email – protocols and practices; Transfer of information via CD Rom/Floppy Disk; Use of PDF and other secure files.
- Confidentiality considerations - Confidentiality practices to protect the organisation; Confidentiality practices to protect the client; Confidentiality practices to protect providers of information/research cohorts.

T5 Data collection techniques encompassing:

- Data types - Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.
- Data Collection - Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, focus groups; Literature reviews, including; traditional and web-based; Group facilitation and presentation; Questioning, active listening and clarification; Obstacles to data collection, including; unavailable data, inconsistent data, confidentiality, security; Data limitations.
- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to

REQUIRED SKILLS AND KNOWLEDGE

research; Relevance to research objectives.

T6 Data analysis and presentation encompassing:

- Data analysis techniques - Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.
- Data analysis technique selection - Determining the correct analysis technique(s); Determining the correct sequence of analysis techniques; Accommodating influencing factors including research objectives, budget, timeline and quality requirements, data limitations, confidentiality, security and the like.
- Data interpretation - Determining results; determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.
- Data presentation:
  - Determining the correct form of presentation for the audience, including; colleagues, scientific community, marketing and commercialisation specialists, general community, industry, mixed (i.e. conference audience).
  - Forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams, electronic formats; Forms of verbal presentation, including meetings, client briefings, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

T7 Product development and trials encompassing:

- Identifying client and managerial requirements for production and trials - Required outcome(s); Key performance indicators; Timelines; Financing; Resources; Quality Assurance and the like.
- Influencing factors - Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements; Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like.
- Product development arrangements - Licensing agreements; Joint Ventures; Sole Ventures and the like.
- Relevant Documentation - Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- Development & trial processes - Proof of concept; Trialing concepts; Definitions/Specifications; Types of development and trial processes, including Phase A product and trial, Phase B product and trial, User trials, Ergonomics and Usability testing; Pre-defined acceptance criteria, confidence limits; Data collection & analysis; Production; Evaluation and recommendation formulation.

REQUIRED SKILLS AND KNOWLEDGE

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- Intellectual Property and Australian Law - The place of Intellectual Property in Australian Law; Past cases and outcomes; Necessary considerations and the like.
- The nature of Intellectual Property - What is Intellectual Property? What isn't Intellectual Property?; Why is Intellectual Property relevant?; What can Intellectual Property rights do?; What can't Intellectual Property rights do?
- Intellectual Property Rights - Patents; Copyright; Designs; Confidential Information; Other specialty rights and the like.
- Managing Intellectual Property - Identifying Intellectual Property; Deciding what to protect; Strategies for managing Intellectual Property; How can Intellectual Property rights work together?; Intellectual Property versus time, effort, finances; Sources of Assistance, including Publications, Intellectual Property professionals, Lawyers, Business Advisors, Marketing consultants and the like.
- Enforcement of Intellectual Property - The enforcement process; The role of lawyers; Resolution.
- The changing face of Intellectual Property - Development of Intellectual Property Right Laws; Changes to Intellectual Property Right laws; Extensions of Intellectual Property Rights into non-traditional areas, including cultural, property arenas; The global marketplace and the like.

T9 Occupational Health and Safety principles and fundamentals encompassing:

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- employer and employee responsibilities, rights and obligations.
- major functions of safety committees and representatives.
- powers given to Occupational Health and Safety Inspectors
- housekeeping and potential hazards in relation to improper housekeeping
- selecting appropriate personal protective equipment (PPE) given hazardous situations

T10 The work environment encompassing:

- typical hazards associated with a range of work environments
- procedures used to control the risks associated with these hazards
- principles of risk assessment / management and state the purpose of each.
- hierarchy of OH&S hazard control measures.
- required documentation for risk assessment.
- commonly used workplace safety signs.
- workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation.
- appropriate fire extinguisher for a given type of fire.
- requirements for the location, mounting and maintenance of portable fire extinguishers.

REQUIRED SKILLS AND KNOWLEDGE

- basic process of fighting a fire.
- safe premises, buildings and security are important in an industrial setting and the consequences of non- compliance with these.
- standard work procedure is and why they are required in some circumstances.

T11 Manual Handling encompassing:

- typical manual handling injuries and the effect they can have on lifestyle
- situations that may cause manual handling injuries
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- hazardous substances and dangerous goods.
- Classification of chemicals as hazardous substances and/or dangerous goods
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- dangers associated with working on ladders and scaffolds
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- selecting an appropriate ladder for a given situation and perform a safety check before use
- precautions that should be taken when ascending and working off a ladder
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T13 Confined spaces encompassing:

- hazards associated with working in a confined space
- identifying workplace situations that could be classified as a confined space
- control measures for working in a designated confined space

T14 Physical and psychological hazards encompassing:

- short and long term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
- effects of vibration on the human body and work practices to protect against vibration
- effects of thermal stress on the human body and work practices to protect against thermal stress
- effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation.
- dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger.
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- factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
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T15 Working safely with electricity encompassing:

- effects of electric shock on the human body
- common causes of electrical accidents
- precautions that can minimise the chance of electric shock (earthing, extra low voltage, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
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- responsibilities of the First Aider.
- priorities of first aid management for any accident or injury.
- procedures required at an accident scene.
- legal and ethical issues, which may impact on the management of care.
- 'Duty of Care'.
- examination of a casualty for injuries.
- effect of cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
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- signs and symptoms of an altered level of consciousness
- management of simulation of a casualty with an altered level of consciousness.
- signs and symptoms of shock.
- management of simulation of a casualty in shock

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the

EVIDENCE GUIDE

Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

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Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also

EVIDENCE GUIDE

comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Contribute to the development of a product/application/service as described in 8) and including:

    A Demonstrating consistent performance for each Element of the unit

    B Meeting the performance criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace

    C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

Note:
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with

EVIDENCE GUIDE

performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the development of a product/application/service.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A	Participate in, lead and facilitate work teams
UEENEER001B	Contribute to the planning of a research project

EVIDENCE GUIDE

UEENEER002B	Conduct to the conduct of a research project
UEENEER004B	Contribute to the trial of a product/application/service
UEENEER005B	Contribute to intellectual property management
BSBCMN306A	Produce business documents
BSBSBM405A	Monitor and manage business operations
UEENEER006B	Contribute to the commercialisation of a product/application/service
PMBQUAL309A	Solve problems using 'quality tools'

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the development of a product/application/service.

Product/application/service design and development briefs may be provided by external and/or internal clients.

Typically the work covered by this unit is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the product/application/service being developed.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights

RANGE STATEMENT

that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Resources, which may be subject to negotiation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Research

UEENEER004B Contribute to the trial of a product/application/ service

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the ability to assist the manager's plan, coordinate and report on a product/application/service trial.

Application of the Unit

Application of the Unit **4)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Acquire and understand background information relevant to the trial of the product/application/service.	1.1	Information sources about the research topic are identified and evaluated for reliability and validity.
	1.2	Information about the consumer, product, market and competition is collected, reviewed and understood.
	1.3	Key clients/stakeholders and their particular views and interests are identified and recorded.

ELEMENT	PERFORMANCE CRITERIA	
	1.4	The context (industrial, legal, ethical, political etc) of the research project is identified and understood.
2 Understand the logistics of a trial of a product, application and/or service	2.1	Client, stakeholder and organisational requirements are identified and understood.
	2.2	Contractual obligations of the project are identified and understood.
	2.3	Resources available to support the project are identified and understood.
	2.4	Quality standards for the project are identified and understood.
3 Contribute to the trial of a product, application and/or service	3.1	Project objectives, methodology and strategies appropriate to the requirements and contractual obligations of the project are identified and selected in a team environment.
	3.2	Project phases, milestones, reporting and review points are identified in a team environment.
	3.3	Criteria for evaluating each project deliverable against predefined quality standards are developed in a team environment.
	3.4	A Research Plan is developed in a team environment.
4 Seek endorsement and ensure distribution of a trial of a product, application and/or service	4.1	The draft Research Plan is forwarded to clients/stakeholders/ appropriate personnel for perusal and comment.
	4.2	The draft Research Plan is amended to incorporate recommended improvements from clients/stakeholders/appropriate personnel
	4.3	The final Research Plan is confirmed against overall project deliverables by appropriate personnel.
	4.4	The final Research Plan is distributed to all appropriate personnel and team members.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the trial of a product/application/service.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER004B Product/application/service trials

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the trial of a product/application/service.

T1 Project planning

- Purpose of project planning
- Documents needed to plan a project
- Factors influencing sequence and restraints of project activities
- Critical path analysis encompassing:
  - Graphical representation methods
  - Methods of representing time/rates

T2 Research concepts encompassing:

- Terminology - Terminology used in a research workplace; Terminology used in research-specific literature and the like.
- Theory – why conduct research, The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.
- The research environment - The research work environment; Standard research practices; Industrial, legal, ethical, political and market environment considerations; Legislation and regulation; Contractual obligations of all parties and the like.
- Planning to conduct research - Concept development and/or research brief analysis; Research objectives; Research deliverables; Research project plan; Literature reviews; Methodology development, including; Experimental design, Technology selection, Information Management system selection and the like
- Clients - Identifying client viewpoints and stake in project; Identifying client requirements and parameters; Determining research budgets, timelines, milestones and quality attributes with clients.
- Research, Development and Commercialisation - Research and Development goals versus Commercialisation goals and realities; Research and Development to inspire a commercialisation process.

T3 Work in a team encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Types of teams - Managerial, Administrative, Project-based, Commercial and Social
- Roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management, clients and the like.
- Working in a team - Identification and utilisation of team member skills and knowledge; Maximising benefits of team diversity; Team planning; Team commitment and cooperation; Improving/Maximising team performance to achieve goals; Team monitoring and adjustment; Plain English literacy and communication; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with clients and the like.
- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

T4 Scientific writing and communication encompassing:

- Types of scientific writing and communication - The distinguishing characteristics of the different types of scientific writing.
- Purpose of the different types of scientific writing - Product development justification and specifications; Management advice; Scientific papers/publications; Conference/meeting presentations; Policy documents; Planning documents; Reports and the like.
- Types of audience - The features and characteristics of an audience, including; an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'Plain English' written and oral communication.
- Scientific writing techniques - The component parts of scientific documents, including: Aim, Materials, Method, Results, Discussion, Conclusion, References; The required content of each component part; Scientific referencing techniques, including: Bibliographies, Reference Lists, Citations, Footnotes, Quotes, and Acknowledgements; Scientific labelling techniques, including: Graphs, Tables, Diagrams, and Figures; Techniques for documenting results, including: Text, Graphs, Tables, Diagrams, and Figures; Organisational standards for document and presentation production, including: Standard organisational document templates, letterheads, headers, footers, and logos.
- Oral communication techniques - Techniques for communicating to large groups, including; Conference presentations, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
- Electronic communication formats - World-wide Web – protocols and practices; Email – protocols and practices; Transfer of information via CD Rom/Floppy Disk; Use of PDF and other secure files.
- Confidentiality considerations - Confidentiality practices to protect the organisation; Confidentiality practices to protect the client; Confidentiality practices to protect providers of information/research cohorts.

REQUIRED SKILLS AND KNOWLEDGE

T5 Data collection techniques encompassing:

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Licensing agreements; Joint Ventures; Sole Ventures and the like.

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REQUIRED SKILLS AND KNOWLEDGE

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EVIDENCE GUIDE

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9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Contribute to the trial of a product/application/service as described in 8) and including:

    A Demonstrating consistent performance for each Element of the unit

    B Meeting the performance criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace

EVIDENCE GUIDE

C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

Note:
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the trial of a product/application/service.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

EVIDENCE GUIDE

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A	Participate in, lead and facilitate work teams
UEENEER001B	Contribute to the planning of a research project
UEENEER002B	Conduct to the conduct of a research project
UEENEER004B	Contribute to the trial of a product/application/service
UEENEER005B	Contribute to intellectual property management
BSBCMN306A	Produce business documents
BSBSBM405A	Monitor and manage business operations
UEENEER006B	Contribute to the commercialisation of a product/application/service
PMBQUAL309A	Solve problems using 'quality tools'

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the trial and, where necessary, retrial of products, applications and/or services to meet the requirements of a development brief.

Product/application/service design and development briefs may be provided by external and/or internal clients.

Typically the work covered by this unit is performed by high-level technicians,

RANGE STATEMENT

working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the product/application/service being developed.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain those sections of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the tasks undertaken in trailing products/applications/services. They should be aware of enterprise business goals and the impact of trials on these goals.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Resources, which may be subject to negotiation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5**)

Research

UEERE0006 Conduct periodic maintenance of remote area power supply battery banks

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct periodic maintenance of remote area power supply (RAPS) battery banks where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing for, completing and reporting on maintenance of RAPS battery banks.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0023 Work safely with remote area power supply systems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct periodic maintenance of RAPS battery banks	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a RAPS plant are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of RAPS system is identified from relevant documentation or from relevant person/s to determine the scope of work
	1.5 Instructions for coordinating work with relevant personnel and the local community is obtained from relevant person/s and applied
	1.6 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain RAPS systems battery banks	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 RAPS system battery banks are tested in accordance with relevant workplace procedures

	2.5	Battery bank maintenance, including performance measurements and repairs, is completed safely in accordance with workplace routines and procedures
	2.6	Known types of battery functional faults are identified using fault-finding procedures
	2.7	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.8	Maintenance and repair work is completed minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.9	Quality checks are conducted in accordance with workplace procedures
3 Complete maintenance work on battery banks and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Maintenance issues are referred to the local community in accordance with workplace procedures
	3.4	Battery bank performance measurements are reported to relevant person/s in accordance with maintenance reporting procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK103A Conduct periodic maintenance of remote

area power supply battery banks.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEERE0006 Conduct periodic maintenance of remote area power supply battery banks

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- measuring and recording specific gravity of electrolyte
- measuring and recording cell voltages
- visually inspecting batteries for low electrolyte levels, electrolyte leakage, and corroded terminals and connections
- topping up low electrolyte levels
- identifying electrolyte leaks
- cleaning corroded terminals and connections and treating with an anticorrosive
- reporting all maintenance activities
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking isolation of circuits/machines/systems
- coordinating work with relevant person/s and the local community
- determining live testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- maintaining remote area power supply (RAPS) battery banks, including:
  - conducting quality checks.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- RAPS systems battery bank maintenance techniques, including:
  - basic battery maintenance encompassing:

    - scope of regular testing, checking and corrective actions
    - measurement of specific gravity and voltages of battery cells
    - checking and topping up electrolyte levels
    - checking for acid leakage, cracks in battery casing, corrosion of battery terminals and connections
    - cleaning of terminal connections and treating with an anticorrosive
- battery bank performance measurement
- methods for identification of battery bank faults
- relevant battery manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practice in relation to conducting periodic maintenance of RAPS battery banks
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEERE0007 Conduct periodic maintenance of remote area power supply generator sets

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct periodic maintenance of remote area power supply (RAPS) generator sets where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing for, completing and reporting on maintenance of RAPS generator sets.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0023 Work safely with remote area power supply systems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct periodic maintenance on generator sets	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a RAPS plant are identified and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of RAPS system is identified from relevant documentation or from relevant person/s to determine the scope of work
	1.5 Instructions for coordinating work with relevant personnel and the local community is obtained from relevant person/s and applied
	1.6 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain RAPS systems generator sets	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 RAPS system generator sets are tested in accordance with relevant workplace procedures
	2.5 Generator set maintenance, including performance

		measurements and repairs, is completed safely in accordance with workplace routines and procedures
	2.6	Known types of generator set functional faults are identified using fault-finding procedures
	2.7	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.8	Maintenance and repair work is completed minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.9	Quality checks are conducted in accordance with workplace procedures
3 Complete maintenance work of generator sets and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Maintenance issues are referred to the local community in accordance with workplace procedures
	3.4	Generator set performance measurements are reported to relevant person/s in accordance with maintenance reporting procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Maintaining RAPS generator sets must include at least the following:

- two different systems, including:
  - where the generator set is charged from a generator set and a photovoltaic (PV) array and at least one similar RAPS system where the generator set is charged

from a wind generator

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK104A Conduct periodic maintenance of remote area power supply generator sets.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEERE0007 Conduct periodic maintenance of remote area power supply generator sets

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- coordinating work with relevant personnel and the local community
- determining live electrical work testing/measurement requirements
- checking isolation of circuits/machines/systems
- identifying and accessing materials, tools, equipment and testing devices
- maintaining remote area power supply (RAPS) generator sets measuring and recording generator no-load and load voltages
- measuring and recording generator output for three load conditions
- checking drive engine coolant and oil level
- visually inspecting drive engine for coolant and oil leaks
- checking condition of drive engine oil, oil filter and air filter
- identifying need to change drive engine oil, oil filter and air filter
- changing drive engine oil, oil filter and air filter
- topping up low coolant and oil levels
- identifying the cause of any coolant and oil leaks
- reporting all maintenance activities
- dealing with unplanned events.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

knowledge of:

- RAPS system generator sets maintenance techniques, including:
  - basic generator set maintenance encompassing:
    - checking of radiator and oil level
    - periodic oil change
    - periodic air, oil and fuel filter change
    - maintaining logbooks for maintenance regime
- generator set performance measurement
- methods for identification of generator set faults
- maintenance reporting requirements
- relevant generator set manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practice in relation to conducting periodic maintenance of RAPS generator sets
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEERE0008 Conduct periodic maintenance of remote area power supply photovoltaic arrays

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct periodic maintenance of remote area power supply (RAPS) photovoltaic (PV) arrays where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing for, completing and reporting on maintenance of RAPS PV arrays.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0023 Work safely with remote area power supply systems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct periodic maintenance on PV arrays	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a RAPS plant are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of RAPS system is identified from relevant documentation or from relevant person/s to determine the scope of work
	1.5 Instructions for coordinating work with relevant personnel and the local community are obtained from relevant person/s and applied
	1.6 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain RAPS systems PV arrays	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 RAPS system PV arrays are tested in accordance with relevant workplace procedures
	2.5 PV array maintenance, including performance

		measurements and repairs, is completed safely in accordance with workplace routines and procedures
	2.6	Known types of PV array functional faults are identified using fault-finding procedures
	2.7	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.8	Maintenance and repair work are completed minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.9	Quality checks are completed in accordance with workplace procedures
3 Complete maintenance work of PV arrays and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Maintenance issues are referred to the local community in accordance with workplace procedures
	3.4	PV array performance measurements are reported to relevant person/s in accordance with maintenance reporting procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Maintaining RAPS PV arrays must include at least the following:	• two different systems where the PV array is charged from:
	  • a generator set and a PV array
	  • a wind generator

Exposed voltage is not greater than:	• 50 V a.c., or • 120 V d.c

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK105A Conduct periodic maintenance of remote area power supply photo voltaic arrays.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEERE0008 Conduct periodic maintenance of remote area power supply photovoltaic arrays

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- measuring and recording array no-load and load voltages together with ambient temperature
- measuring and recording array output for three load conditions
- visually inspecting array modules and support structure for physical damage
- visually inspecting array connections and cables
- identifying array defects and faults
- reporting all maintenance activities
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking for damage or de-lamination
- checking isolation of circuits/machines/systems
- cleaning of photovoltaic (PV) modules
- coordinating work with relevant personnel and the local community
- determining live electrical work testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- maintaining remote area power supply (RAPS) PV arrays, including maintaining logbooks and maintenance regime.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- RAPS systems PV array maintenance techniques encompassing:
  - cleaning of PV modules
  - checking for damage or de-lamination
  - checking of module connections, connecting cable and integrity of the array structure
  - maintaining logbooks and maintenance regime
- relevant RAPS system manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practice in relation to conducting periodic maintenance of RAPS PV array
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEERE0009 Conduct periodic maintenance of remote area power supply wind generators

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct periodic maintenance of remote area power supply (RAPS) wind generators where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing for, completing and reporting on maintenance of RAPS wind generators.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0023 Work safely with remote area power supply systems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct periodic maintenance on wind generators	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a RAPS plant are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of RAPS system is identified from relevant documentation or from relevant person/s to determine the scope of work
	1.5 Instructions for coordinating work with relevant personnel and the local community is obtained from relevant person/s and applied
	1.6 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain RAPS systems wind generators	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3 Circuits/machines/plant are isolated in strict accordance with WHS/OHS requirements and workplace procedures
	2.4 RAPS system wind generators are tested in accordance with relevant workplace procedures
	2.5 Wind generator maintenance, including performance

		measurements and repairs, is completed safely in accordance with workplace routines and procedures
	2.6	Known types of wind generator functional faults are identified using fault-finding procedures
	2.7	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.8	Maintenance and repair work are completed minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.9	Quality checks are conducted in accordance with workplace procedures
3 Complete maintenance work of wind generators and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Maintenance issues are referred to the local community in accordance with workplace procedures
	3.4	Wind generator performance measurements are reported to relevant person/s in accordance with maintenance reporting procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK106A Conduct periodic maintenance of remote area power supply wind generators.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEERE0009 Conduct periodic maintenance of remote area power supply wind generators

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- measuring and recording generator no-load and load voltages
- measuring and recording generator output for three load conditions
- visually inspecting generator and support structure for physical damage
- visually inspecting generator connections and cables
- identifying generator defects and faults
- reporting all maintenance activities
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking isolation of circuits/machines/system
- coordinating work with relevant personnel and the local community
- determining live testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- maintaining remote area power supply (RAPS) wind generators.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- RAPS systems wind generator maintenance techniques, including:
  - wind generator minor maintenance encompassing:
    - checking the integrity of support structure
    - tension of stay wires
    - visual inspection of wind generator operation

    - maintaining logbooks and maintenance regime
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to conducting periodic maintenance of RAPS wind generators
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEERE0018 Maintain and repair remote area power generation facilities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain and repair remote area power generation facilities.

It includes preparing for, conducting and reporting on maintenance and repair of remote area power generation facilities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEERE0023 Work safely with remote area power supply systems

UEERE0007 Conduct periodic maintenance of remote area power supply generator sets

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain and repair remote area power generation facilities	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements for a remote area power generation facility are identified and applied in accordance with workplace routines and procedures
	1.2 Risks are identified, assessed and control measures applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of remote area power station facility is obtained from documentation or from relevant person/s to determine the scope of work
	1.5 Advice on coordinating work with others and the local community is obtained from relevant person/s and applied
	1.6 Sources of materials required for work are identified and accessed in accordance with workplace routines and procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain and repair remote area power generation facilities	**2.1** Workplace risk control measures and procedures are applied
	2.2 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.2 Inspection repairs, replacements and/or adjustments are completed on items listed in the maintenance schedule and in accordance with workplace procedures
	2.3 Fuel, coolant, oil and other fluid spills are cleaned and area made safe in accordance with workplace procedures

	2.4	Batteries are serviced and/or replaced as specified in the maintenance schedule and in accordance with workplace procedures
	2.5	Consumables are removed and disposed of in accordance with environmentally safe procedures
	2.6	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.7	Quality checks are conducted in accordance with instructions and workplace procedures
3 Report maintenance and repair of remote area power generation facilities	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Maintenance issues beyond the scope of work are referred to relevant person/s in accordance with workplace procedures
	3.3	Work completed is reported to relevant person/s in accordance with maintenance reporting and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK116A Maintain and repair remote area power generation facilities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEERE0018 Maintain and repair remote area power generation facilities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- understanding the location and nature of the work required
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- determining scope of work from documentation and/or relevant person/s
- identifying and accessing materials, tools, equipment and testing devices
- coordinating work with relevant person/s
- checking isolation of circuits/machines/systems
- correctly inspecting, repairing, replacing and adjusting items listed in the maintenance schedule
- maintaining and repairing remote area power generation facilities
- servicing batteries and battery packs in a community power station
- cleaning fluid spills appropriately
- removing and disposing of consumable following environmentally safe procedures
- conducting quality checks
- dealing with unplanned events
- applying environmentally safe work practices
- completing relevant documentation/reporting.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- remote area essential services power plant, including:
  - minor service and maintenance procedures of diesel-powered generation equipment in accordance with a prepared schedule encompassing:
    - types and grades of inspections, repairs, replacement and/or adjustments under a maintenance schedule:
      - replacement items/materials, including engine oil, oil filters, fuel filters, engine

coolant system filters, air cleaners and fan belts
    - inspection and repair items, including leakages from fuel system, coolant system and lubricating oil system
  - cleaning of fluid spills
  - environmentally safe procedures for removal and disposal of consumables
- servicing batteries and battery packs in a community power station in accordance with the prepared maintenance schedule encompassing:
  - hazards associated with batteries
  - types of batteries and their application in a community power station (starting battery set and switchboard (nicad) batteries)
  - battery maintenance techniques
- schedule regular servicing and maintenance encompassing:
  - engine oil and filter changes
  - fuel filters
  - coolant filters
  - water trap devices
  - drive belt (condition/adjustment)
  - valve adjustments (if applicable)
  - major and minor mechanical servicing by outside agents
  - air cleaner (both dry paper and oil bath types)
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to maintaining and repairing facilities associated with remote area essential service operations
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEERE0019 Maintain safety and tidiness of remote area power supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain the safety and tidiness of remote area power supply (RAPS) systems.

It includes preparing to maintain safety and tidiness of RAPS system equipment, completing work and reporting issues.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERE0023 Work safely with remote area power supply systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain safety and tidiness of RAPS system	**1.1** Work health and safety (WHS)/ occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified and applied
	1.2 Risk control measures are applied in accordance with

		workplace procedures prior to commencing work
	1.3	Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4	Nature and location of the RAPS system is identified from work schedule and relevant person/s to determine the scope of work
	1.5	Advice on coordinating work with relevant personnel and the local community is obtained from relevant person/s and applied
	1.6	Tools and equipment required for cleaning work are obtained and checked for correct operation and safety
2 Maintain RAPS system	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3	Circuits/machines/system are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	RAPS system and area are cleaned in accordance with workplace procedures
	2.5	Cleaning is completed minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.6	Quality checks are conducted in accordance with workplace procedures
3 Complete work and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Cleaning and tidiness issues are reported to the local community in accordance with workplace procedures
	3.3	Cleaning work is completed and issues are reported to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

RAPS system must incorporate a battery bank and at least two of the following:

- generator set
- photovoltaic (PV) array
- RAPS system
- wind generator

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK101A Maintain safety and tidiness of remote area power supply systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEERE0019 Maintain safety and tidiness of remote area power supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- removing non-remote area power supply (RAPS) equipment
- safely removing insects, spiders and any animals
- safely removing dust and dirt from floors and equipment
- identifying and reporting at least two safety issues
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including:
  - applying relevant risk identification, assessment, reporting and control requirements
  - checking isolation of circuits/machines/system
- completing reporting requirements to relevant person/s and local community
- conducting quality checks
- coordinating work with relevant person/s and the local community
- determining live testing/measurement requirements
- maintaining safety and tidiness of RAPS system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- RAPS plant area cleaning, and maintaining RAPS systems, including:
  - need for a clean and tidy plant area
  - RAPS system components and associated equipment and their location within the plant area
  - manual fuel pump, if available
  - plant cleaning techniques:
    - fuel and oil

  - acid spills
  - removal of dust, insects, spiders and animals
  - removal of non-RAPS equipment
- techniques for reporting and dealing with cleaning issues
- relevant safe work method statements (SWMS) or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, policies and procedures, including reporting requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to maintaining safety and tidiness of a RAPS system
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEERE0023 Work safely with remote area power supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to work safely on remote area power supply (RAPS) systems.

It includes preparing to enter a RAPS system, applying safe working practices, and following workplace procedures for hazard identification and risk control in RAPS system areas.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to enter a RAPS system	**1.1** Hazards/risk control procedures for RAPS systems maintenance are identified and applied
	1.2 System access permit is obtained from relevant person/s
	1.3 Preparation for electrical and non-electrical isolation is completed in accordance with workplace procedures

	1.4	Tools and equipment required for work are checked for safety and correct functionality in accordance with workplace procedures
2 Apply safe working practices in RAPS system area	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Safe work practices for RAPS system are applied in accordance with workplace procedures
	2.3	Circuits/machines/system are isolated in accordance with work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures
	2.4	Safe work practices in RAPS system are applied in accordance with workplace procedures
	2.5	Safe working practices are applied minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.6	Quality checks are conducted in accordance with workplace procedures
3 Follow workplace procedures for hazard identification and risk control in RAPS system areas	**3.1**	Risks/hazards are identified, assessed and control measures implemented and monitored through consultation with relevant person/s and the local community
	3.2	Workplace hazards are identified and reported to relevant person/s in accordance with workplace procedures
	3.3	WHS/OHS incident reports are completed in accordance with regulatory requirements and workplace procedures
	3.4	Instructions and training are applied in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Working safely with RAPS system must include at least the following:

- two different systems incorporating the following:
  - battery bank
  - generator set
  - photovoltaic (PV) array
  - one RAPS system with the addition of a wind generator

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK102A Work safely with remote area power supply systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEERE0023 Work safely with remote area power supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- preparing to enter the remote area power supply (RAPS) system including, permission to enter the area and to isolate RAPS equipment
- applying work procedures and instructions as they apply to risk control measures
- dealing with accidents and emergencies
- participating in consultation processes, identifying hazards and implementing and monitoring control measures
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices in RAPS system, including:
  - completing WHS/OHS incident reports
- conducting RAPS system quality checks
- obtaining and inspecting tools and equipment and reporting faults
- preparing for and checking isolation of circuits/machines/systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- RAPS safe working practices, including:
  - general safety encompassing:
    - general safety
    - risk assessment
    - personal protective equipment (PPE)
    - WHS/OHS procedures
  - RAPS safety and risk assessment encompassing:
    - types of hazards in and around RAPS:

        - rotating machines
        - fuels and oils
        - exhaust fumes
        - acids and flammable gases from batteries
    - measures for dealing with hazards in and around RAPS
    - purpose and methods for isolation and de-energisation of power supplies
- correct isolation and de-energisation procedures encompassing:
    - processes for preventing generator from automatically starting
    - isolating photovoltaic (PV) arrays
    - isolating wind driven generators
    - isolating battery
    - isolating inverter power sources
- safety signage encompassing:
    - types of signs
    - location
    - condition
    - suitability
- access to system encompassing:
    - methods for limiting access to plant areas
- reporting
- access to RAPS, including:
    - obtaining access permit/s
- relevant manufacturer specifications
- relevant workplace documentation, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry

- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEERE0041 Maintain operation of remote area power generation plant

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain operation of remote area power generation plant where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing for, conducting, completing and reporting on maintenance of power generation plant.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0018 Maintain and repair remote area power generation facilities

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for maintenance	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements for a remote area power generation plant are identified and applied in accordance with workplace procedures

	1.2	Risks are identified, assessed and control measures applied in accordance with workplace procedures prior to commencing work
	1.3	Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4	Nature and location of the power plant are obtained from documentation or from work supervisor to determine the scope of work to be undertaken
	1.5	Advice on coordinating work with others and the local community is obtained from relevant person/s and applied
	1.6	Sources of materials required for work are identified and accessed in accordance with workplace routines and procedures
	1.7	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Conduct maintenance work	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Relevant maintenance procedures are applied to test and check remote area power plant
	2.4	Known types of remote area power plant functional faults are identified and repaired in accordance with workplace procedures
	2.5	Maintenance performance measurements and repairs are conducted safely in accordance with workplace routines and procedures
	2.6	Workplace procedures are applied for referring non-routine events to relevant person/s for directions
	2.7	Maintenance and repair work is conducted minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.8	Quality checks are conducted in accordance with instructions and workplace procedures

3	**Complete maintenance work and reporting**	**3.1** Workplace risk control measures and procedures are applied
		3.2 Worksite is cleaned and made safe in accordance with workplace procedures
		3.3 Maintenance issues beyond the scope of work are referred to relevant person/s in accordance with workplace procedures
		3.4 Work completed is reported to relevant person/s in accordance with maintenance reporting and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK120A Maintain operation of remote area power generation plant.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Requirements for UEERE0041 Maintain operation of remote area power generation plant

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- understanding the location and nature of the work required
- following prescribed procedures to testing and checking plant
- identifying and repairing known functional faults
- carrying out maintenance and repairs effectively
- identifying maintenance issues beyond the scope of prescribed work and notifying appropriate person/s
- documenting work activities accurately
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking isolation of circuits/machines/systems
- conducting quality checks
- identifying and accessing materials, tools, equipment and testing devices
- maintaining operation of remote area power generation plant.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- minor servicing of a remote area power generating plant encompassing:
    - engine oil and filters
    - fuel filters
    - coolant filters
    - water trap devices
    - air cleaners
- minor maintenance of a remote area power generating plant encompassing:
    - fan and accessory drive belts

    - repair of minor leaks: coolant, oil and fuel
- servicing of a remote area power generating plant battery systems encompassing:
    - starting battery set
    - switchboard (nicad) batteries
- information displayed by the instruments/meters in a remote area power generating plant encompassing:
    - generating equipment (diesel engine)
    - engine lubrication
    - system oil pressure
    - engine cooling system coolant
    - temperature (in and out)
    - fuel pressure
    - current
    - voltage
    - power (kW)
    - kilowatt hours
    - frequency, hertz (Hz)
    - engine running hours
    - station services: fuel tank dip and lubricating oil tank level
    - fuel flow meter
- use of the information gathered from instruments/meters encompassing:
    - ordering of fuel, lubricating oil and coolant
    - scheduling regular servicing and maintenance for engine oil and filter changes, fuel filters, drive belt (condition/adjustment), valve adjustments (if applicable), major and minor mechanical servicing by outside agents and air cleaner (both dry paper and oil bath types)
- power plant log sheets and readings encompassing:
    - completed log sheets
    - forwarding information to appropriate person/location at regular intervals (weekly)
- general cleanliness of the power generating plant and buildings encompassing:
    - generation plant
    - oil leaks
    - water leaks
    - fuel leaks
    - safety awareness
    - plant buildings
    - internal floor area
    - used consumables
    - spare parts storage
    - spider webs and other pests

    - rubbish containers
    - ventilation
    - power station compound
    - fence and gate (if applicable)
    - weeds
    - grass (if applicable)
    - rubbish containers
    - fuel and oil supply (drums)
    - water reticulation (if applicable)
    - tools and equipment
    - location/storage
    - cleanliness
    - maintenance
    - drain/drip tins
    - safety signage
    - location
    - condition
    - suitability
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE)

currently used in industry
- resources that reflect current industry practices in relation to maintaining operation of remote area power generation plant
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

UEPOPS038 Evaluate cost estimations and initiate appropriate solutions

Modification History

Release 1. This is the first release of this unit of competency in the UEP Electricity Supply Industry - Generation Sector Training Package Release 2.0.

Application

This unit involves the skills and knowledge required to evaluate estimated costs for planned and forced power generation plant outages (either a single item or whole unit) and to initiate appropriate solutions.

An outage is when power generation plant and equipment is not available to perform intended function. Forced outage is the shutdown of power generation plant, equipment or a power generation facility when a generating unit is unavailable to produce power due to an unexpected breakdown.

Competency in this unit requires the ability to evaluate work details, identify costs, develop solutions and complete documentation. Individuals will, in general, work under supervision, in a power generation facility as an operator with responsibility for maintenance budgets.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECO0001 Estimate electrotechnology projects

Competency Field

Operations

Unit Sector

Electricity generation

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

outcomes.	demonstrate achievement of the element.
1 Evaluate work details	**1.1** Power generation plant outage work plan and methods are evaluated in accordance with workplace procedures
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) regulations, legislative requirements, codes of practice, manufacturers' recommendations and specifications, environmental requirements and workplace procedures are identified, applied and monitored
	1.3 Timeframes for power generation plant outage work are identified in accordance with workplace procedures
	1.4 Details of materials, equipment, specialist services and contractual provisions are identified in accordance with workplace procedures
	1.5 Specific disposal requirements are evaluated in accordance with workplace procedures
2 Identify costs	**2.1** Costs associated with the planned and forced outages are evaluated in accordance with workplace procedures
	2.2 Previous planned and forced outages are analysed to determine problems in accordance with workplace procedures
3 Develop solutions	**3.1** Potential solutions to limit timeframe and budget over runs are identified in accordance with workplace procedures
	3.2 Potential variations in planned and forced outages scope of work are identified and solutions are developed in accordance with workplace procedures
4 Complete documentation	**4.1** Evaluation report is produced in accordance with workplace procedures
	4.2 Possible increases in budget are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEP Electricity Supply Industry - Generation Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEPOPS520 Evaluate cost estimations and initiate appropriate solutions.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8

Assessment Requirements for UEPOPS038 Evaluate cost estimations and initiate appropriate solutions

Modification History

Release 1. This is the first release of this unit of competency in the UEP Electricity Supply Industry - Generation Sector Training Package Release 2.0.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - emergency procedures
  - risk control measures
  - safe working practices
- communicating with key stakeholders
- completing documentation
- developing planned and forced outage cost solutions
- evaluating planned and forced outage details
- identifying planned and forced outage costs using data analysis
- implementing regulations, legislative requirements, codes of practice, manufacturers' recommendations and specifications, and environmental requirements
- producing quotations and cost options
- recognising cause and consequences of potential costs using data analysis techniques and tools
- utilising costing and quoting techniques.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and include knowledge of:

- arrangements of power production plant
- costing and quotation techniques
- data analysis
- planned and forced outages
- potential solutions for outage costs
- power generation plant and equipment, location and operating parameters
- regulations, legislative requirements, codes of practice, manufacturers' recommendations and

specifications, and environmental requirements
- WHS/OHS requirements, including:
  - emergency procedures
  - risk control measures
  - safe working practices
- workplace documentation
- workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8

UEPOPS515 Coordinate power generation

Modification History

Release 1. This is the first release of this unit of competency in the UEP Generation Training Package.

Application

This unit involves the skills and knowledge required to coordinate the operation and control of multiple power generators sharing load under the control of one operator.

Operators are responsible for starting and stopping power generators. Depending on need this includes synchronising and adjusting voltage output, troubleshooting, fixing problems and responding to emergencies.

Competency in this unit requires the ability to plan for power generating plant operations, operate power generator and excitation system, control generation of electrical energy, coordinate generation control, monitor system and/or power generating plant and the completion of all documentation. Individuals will, in general, work as an operator with responsibility for coordinating power generation, in a power generation facility.

Power generation plant operators are typically trained and authorised to isolate, prepare plant and issue permits to work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Note: Workplace practice

The application of the skills and knowledge described in this unit may require a licence or training permit to practice in the workplace where work is carried out on gas and electrical installations. Additional conditions may apply under state and territory legislative and regulatory licensing requirements.

Pre-requisite Unit

There are no prerequisite units.

Competency Field

Operations

Unit Sector

Electricity generation

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for plant operation	**1.1** Power generating safety issues are identified, in accordance with workplace procedures and Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) legislation
	1.2 Work, power generation plant and resource requirements are identified, in accordance with workplace procedures, from relevant information and documentation
	1.3 Preoperational checks of power generation plant operations are carried out, in accordance with workplace procedures and site requirements
2 Operate generator and excitation system	**2.1** Generator and excitation system is operated, in accordance with workplace procedures and manufacturers' operating recommendations
	2.2 Synchronising requirements are assessed and evaluated, in accordance with workplace procedures to ensure generator and excitation system stability
	2.3 Generator and excitation system is monitored and observed, in accordance with workplace procedures, to detect deviations from normal operating conditions
	2.4 Corrective actions are taken to rectify generator and excitation system abnormalities, in accordance with manufacturers' recommendations and workplace procedures
3 Control generation of electrical energy	**3.1** Power generator output is adjusted, in accordance with workplace procedures, to meet electricity demand whilst observing operating requirements
	3.2 Reactive power generation and voltage regulation requirements are assessed and the generator and excitation system is controlled to achieve desired output, in accordance with workplace procedures
	3.3 Generator stabilities and operating limits are assessed and the generator and excitation system is controlled to maintain those limits, in accordance with workplace

		procedures and manufacturers' recommendations
	3.4	Generator cooling systems and limits are monitored and assessed, and the excitation system is controlled to maintain those limits, in accordance with workplace procedures and manufacturers' recommendations
4 Coordinate generation control	**4.1**	Load sharing between multiple generators is controlled, in accordance with workplace procedures, to maintain optimum efficiency and power generating plant reliability
	4.2	Output of generators is adjusted to meet electricity demand whilst observing operating requirements, in accordance with workplace procedures
	4.3	Generator and excitation system and power generating plant key indicators are monitored and adjusted, in accordance with workplace procedures, to maintain limits and detect deviations from normal operating conditions
	4.4	Corrective actions are taken to rectify generator and excitation system abnormalities, in accordance with manufacturers' recommendations and workplace procedures
	4.5	Generator and excitation system integrity and continuity of supply are maintained, in accordance with workplace procedures
	4.6	Consultation with appropriate personnel is undertaken, in accordance with workplace procedures
	4.7	Generator and excitation system is operated at optimum efficiency, in accordance with workplace procedures
5 Monitor system and plant	**5.1**	Generator and excitation system or power generating plant to be monitored is physically identified, in accordance with workplace procedures
	5.2	Generator and excitation system or power generating plant is monitored, in accordance with workplace procedures, for normal operation or to detect deviations
	5.3	Corrective actions are taken, in accordance with workplace procedures
	5.4	Appropriate personnel are notified, in accordance with workplace procedures, when defects and abnormal

		operating conditions are detected
6 Analyse system and plant faults	**6.1**	Causes of abnormal generator and excitation system operating conditions are identified, in accordance with workplace procedures, by analysing technical and operational information
	6.2	Corrective actions to rectify faults are determined, in accordance with workplace procedures
	6.3	Generator and excitation system or power generating plant integrity is maintained, in accordance with workplace procedures, through consultation with appropriate personnel and reference to technical and operational documentation
	6.4	Appropriate personnel, including specialists, are arranged for investigation of identified operational abnormalities, in accordance with workplace procedures
7 Complete documentation	**7.1**	Power generation plant problems, movements and status are reported, in accordance with workplace procedures
	7.2	Documentation is updated, in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEPOPS515B Coordinate power generation.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8

Assessment Requirements for UEPOPS515 Coordinate power generation

Modification History

Release 1. This is the first release of this unit of competency in the UEP Generation Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and includes:

- analysing generator and excitation system and power generation plant faults using data analysis techniques and tools
- applying Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) requirements including:
  - emergency procedures
  - risk control measures
  - safe working practices
- communicating with personnel
- completing documentation using recording procedures
- controlling and coordinating power generation of electrical energy
- coordinating power generation control
- coordinating operation of equipment to maintain power generation plant integrity and continuity of supply including:
  - clarifying power generation plant status
  - determining appropriate corrective actions
  - maintaining power generator unit integrity
  - recognising abnormal plant operating conditions
- interpreting manufacturers' specifications and manuals
- interpreting remote indication of power generation plant status and condition
- monitoring generator and excitation system and power generation plant
- operating generator and excitation system
- planning for one operator isolated power generation plant operations

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions and includes knowledge of:

- analysis of system faults typical arrangements of power production plant
- coordination of power generation including one operator isolated power generation plant operations
- generator excitation and cooling systems, types and characteristics types
- identification of power generation plant status
- legislation, industry standards, codes of practice and regulations
- manufacturers' specifications and manuals
- operation of generator and excitation system
- power generation plant and equipment, its location and operating parameters
- power generation plant process control systems, system components and interactions
- WHS/OHS legislated requirements including:
  - emergency procedures
  - risk control measures
  - safe working practices
- workplace documentation
- workplace policies and procedures

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations. Where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8

UET Transmission, Distribution and Rail Sector

Modification History

Not applicable.

Credit Arrangements

Currently there are no credit transfer arrangements between qualifications in this Training Package and higher education qualifications.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UETSS00036 Apply Access Procedures to Work On or Near Electrical Network Infrastructure

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00018 Refresher - Apply Access Procedures to Work On or Near Electrical Network Infrastructure

Description

This Skill Set is for individuals who perform the procedures to gain access for work on or near electrical network infrastructure in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00036 Refresher - Apply Access Procedures to Work On or Near Electrical Network Infrastructure Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF09	Apply access procedures to work on or near electrical network infrastructure

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires the application of access procedures to work on or near electrical network infrastructure, to meet work health and safety (WHS)/occupational health and safety (OHS), mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00036 Refresher - Apply Access Procedures to Work On or Near Electrical Network Infrastructure Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for applying access procedures to work on or near electrical network infrastructure.

Custom Content Section

Not applicable

UETSS00037 Apply ESI Safety Rules, Codes of Practice & Procedures for Work On or Near Electrical Apparatus

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00019 Refresher - Apply ESI Safety Rules, Codes of Practice and Procedures for Work On or Near Electrical Apparatus

Description

This Skill Set is for individuals who apply electricity supply industry (ESI) safety rules, codes of practice and procedures for work on or near electrical apparatus in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00037 Refresher - Apply ESI Safety Rules, Codes of Practice and Procedures for Work On or Near Electrical Apparatus Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF01	Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires the application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus to meet work health and safety (WHS)/occupational health and safety (OHS), mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00037 Refresher - Apply ESI Safety Rules, Codes of Practice and Procedures for Work On or Near Electrical Apparatus Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for applying electricity supply industry (ESI) safety rules, codes of practice and procedures for work on or near electrical apparatus.

Custom Content Section

Not applicable.

UETSS00038 Perform Cable Pit-Trench-Excavation Rescue

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00020 Refresher - Perform Cable Pit-Trench-Excavation Rescue.

Description

This Skill Set is for individuals who perform cable pit-trench-excavation rescues.

Pathways Information

The UETSS00038 Perform Cable Pit-Trench-Excavation Rescue Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID009 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 Unit of Competency must be attained.

UETDRRF001 Perform cable pit/trench/excavation rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires workers to perform cable pit-trench-excavation rescues to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00038 Perform Cable Pit-Trench-Excavation Rescue Skill Set from the UET

Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing cable pit-trench-excavation rescues.

Custom Content Section

Not applicable

UETSS00039 Perform Cable Pit-Trench-Excavation Rescue and CPR

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00021 Refresher - Perform Cable Pit-Trench-Excavation Rescue and CPR

Description

This Skill Set is for individuals who perform cable pit-trench-excavation rescues and cardiopulmonary resuscitation (CPR) in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00039 Perform Cable Pit-Trench-Excavation Rescue and CPR Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 Units of Competency must be attained.

HLTAID009	Provide cardiopulmonary resuscitation
UETDRRF001	Perform cable pit/trench/excavation rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires workers to perform cable pit-trench-excavation rescues and cardiopulmonary resuscitation (CPR) to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00039 Perform Cable Pit-Trench-Excavation Rescue and CPR Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing cable pit-trench-excavation rescue and cardiopulmonary resuscitation (CPR).

Custom Content Section

Not applicable

UETSS00040 Perform CPR

Modification History

Release 2. Superseded Unit of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00022 Refresher - Perform CPR

Description

This Skill Set is for individuals who perform cardiopulmonary resuscitation (CPR) in the context of transmission, distribution or rail work functions.

Pathways Information

UETSS00040 Perform CPR Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 Unit of Competency must be attained.

HLTAID009 Provide cardiopulmonary resuscitation

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing cardiopulmonary resuscitation (CPR) to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00040 Perform CPR Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing cardiopulmonary resuscitation (CPR).

Custom Content Section

Not applicable.

UETSS00041 Perform EWP Controlled Descent Escape

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00023 Refresher - Perform EWP Controlled Descent Escape

Description

This Skill Set is for individuals who perform elevated work platform (EWP) controlled descent escapes in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00041 Refresher - Perform EWP Controlled Descent Escape Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF08 Perform EWP controlled descent escape

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing EWP controlled descent escapes to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00041 Refresher - Perform EWP Controlled Descent Escape Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing elevated work platform (EWP) controlled descent escapes.

Custom Content Section

Not applicable.

UETSS00042 Perform EWP Rescue

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00024 Refresher - Perform EWP Rescue

Description

This Skill Set is for individuals who perform elevated work platform (EWP) rescues in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00042 Perform EWP Rescue Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID009 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 Unit of Competency must be attained.

UETDRRF002 Perform EWP rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing EWP rescues to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00042 Perform EWP Rescue Skill Set from the UET Transmission, Distribution and

Rail Sector Training Package meets the industry requirements for performing elevated work platform (EWP) rescues.

Custom Content Section

Not applicable.

UETSS00043 Perform EWP Rescue and CPR

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00025 Refresher - Perform EWP Rescue and CPR

Description

This Skill Set is for individuals who perform elevated work platform (EWP) rescues and cardiopulmonary resuscitation (CPR) in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00043 Perform EWP Rescue and CPR Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 Units of Competency must be attained.

HLTAID009	Provide cardiopulmonary resuscitation
UETDRRF002	Perform EWP rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing EWP rescues and CPR to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00043 Perform EWP Rescue and CPR Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing elevated work platform (EWP) rescues and cardiopulmonary resuscitation (CPR).

Custom Content Section

Not applicable.

UETSS00044 Perform Pole Top Rescue

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00026 Refresher - Perform Pole Top Rescue

Description

This Skill Set is for individuals who perform pole top rescues in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00044 Perform Pole Top Rescue Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID009 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 Unit of Competency must be attained.

UETDRRF003 Perform pole top rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing pole top rescues to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00044 Perform Pole Top Rescue Skill Set from the UET Transmission, Distribution

and Rail Sector Training Package meets the industry requirements for performing pole top rescues.

Custom Content Section

Not applicable.

UETSS00045 Perform Pole Top Rescue and CPR

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00027 Refresher - Perform Pole Top Rescue and CPR

Description

This Skill Set is for individuals who perform pole top rescues and cardiopulmonary resuscitation (CPR) in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00045 Perform Pole Top Rescue and CPR Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 Units of Competency must be attained.

HLTAID009	Provide cardiopulmonary resuscitation
UETDRRF003	Perform pole top rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing pole top rescues and CPR to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00045 Perform Pole Top Rescue and CPR Skill Set from the UET Transmission,

Distribution and Rail Sector Training Package meets the industry requirements for performing pole top rescues and cardiopulmonary resuscitation (CPR).

Custom Content Section

Not applicable.

UETSS00046 Perform Rescue from a Live LV Panel

Modification History

Release 2. Superseded Unit of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00028 Refresher - Perform Rescue from a Live LV Panel

Description

This Skill Set is for individuals who perform rescues from live low voltage (LV) panels in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00046 Perform Rescue from a Live LV Panel Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID009 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 Unit of Competency must be attained.

UETDRRF004 Perform rescue from a live LV panel

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing rescues from a live LV panel to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00046 Perform Rescue from a Live LV Panel Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing rescues from live low voltage (LV) panels.

Custom Content Section

Not applicable.

UETSS00047 Perform Rescue from a Live LV Panel and CPR

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00029 Refresher - Perform Rescue from a Live LV Panel and CPR

Description

This Skill Set is for individuals who perform rescues from live low voltage (LV) panels and cardiopulmonary resuscitation (CPR) in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00047 Perform Rescue from a Live LV Panel and CPR Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 Units of Competency must be attained.

HLTAID009	Provide cardiopulmonary resuscitation
UETDRRF004	Perform rescue from a live LV panel

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing rescues from live LV panels and CPR to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00047 Perform Rescue from a Live LV Panel and CPR Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing rescues from live low voltage (LV) panels and cardiopulmonary (CPR).

Custom Content Section

Not applicable.

UETSS00048 Perform Rescue from Switchyard Structures at Heights

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00030 Refresher - Perform Rescue from Switchyard Structures at Heights

Description

This Skill Set is for individuals who perform rescues from switchyard structures at heights in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00048 Perform Rescue from Switchyard Structures at Heights Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID009 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 Unit of Competency must be attained.

UETDRRF005 Perform rescue from switchyard structures at heights

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing rescues from switchyard structures at heights to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00048 Perform Rescue from Switchyard Structures at Heights Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing rescues from switchyard structures at heights.

Custom Content Section

Not applicable.

UETSS00049 Perform Switchyard Rescue at Heights and Provide First Aid

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00031 Refresher - Perform Switchyard Rescue at Heights and Provide First Aid

Description

This Skill Set is for individuals who perform switchyard rescues at heights and provide first aid in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00049 Perform Switchyard Rescue at Heights and Provide First Aid Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID009 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 Units of Competency must be attained.

UETDRRF005	Perform rescue from switchyard structures at heights
UETDRRF007	Provide first aid in an ESI environment

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing switchyard rescues at heights and providing first aid to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00049 Perform Switchyard Rescue at Heights and Provide First Aid Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing switchyard rescues at heights and providing first aid.

Custom Content Section

Not applicable.

UETSS00050 Perform Tower Rescue

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00032 Refresher - Perform Tower Rescue

Description

This Skill Set is for individuals who perform tower rescues in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00050 Perform Tower Rescue Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID009 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 Unit of Competency must be attained.

UETDRRF006 Perform tower rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing tower rescues to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00050 Perform Tower Rescue Skill Set from the UET Transmission, Distribution

and Rail Sector Training Package meets the industry requirements for performing tower rescues.

Custom Content Section

Not applicable.

UETSS00051 Perform Tower Rescue and Provide First Aid

Modification History

Release 2. Superseded Units of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00033 Refresher - Perform Tower Rescue and Provide First Aid

Description

This Skill Set is for individuals who perform tower rescues and provide first aid in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00051 Perform Tower Rescue and Provide First Aid Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID009 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 Units of Competency must be attained.

UETDRRF006	Perform tower rescue
UETDRRF007	Provide first aid in an ESI environment

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing tower rescues and providing first aid to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00051 Perform Tower Rescue and Provide First Aid Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing tower rescues and providing first aid.

Custom Content Section

Not applicable.

UETSS00052 Provide First Aid in an ESI Environment

Modification History

Release 2. Superseded Unit of Competency updated

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00034 Refresher - Provide First Aid in an ESI Environment

Description

This Skill Set is for individuals who provide first aid in an electricity supply industry (ESI) environment in the context of transmission, distribution or rail work functions.

Pathways Information

UETSS00052 Provide First Aid in an ESI Environment Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID009 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 Unit of Competency must be attained.

UETDRRF007 Provide first aid in an ESI environment

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires providing first aid in an ESI environment to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00052 Provide First Aid in an ESI Environment Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for providing first aid in an electricity supply industry (ESI) environment.

Custom Content Section

Not applicable.

UETSS00053 Testing of Connections to Low Voltage Electricity Networks

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00035 Refresher - Testing of Connections to Low Voltage Electricity Networks

Description

This Skill Set is for individuals who test connections to low voltage (LV) electricity networks in the context of transmission, distribution or rail work functions.

Pathways Information

UETSS00053 Refresher - Testing of Connections to Low Voltage Electricity Networks Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF11 Testing of connections to low voltage electricity networks

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires testing connections to LV electricity networks to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00053 Refresher - Testing of Connections to Low Voltage Electricity Networks Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the

industry requirements for testing connections to low voltage (LV) electricity networks.

Custom Content Section

Not applicable.