NTC 002
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NTC005

TELECOMMUNICATIONS
TRAINING
FRAMEWORK

NTE005

REGULATORY FRAMEWORK 2

Cabling Provider Rules – Open
and
Certificate II in Telecommunications

Learner Resource & WorkBook

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Version 1.2

Managing Agent

This Learner Resource has been updated by Stephen Hanna and Ken Lingwood of the Southbank Institute of TAFE on behalf of the following consortium:

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Section 1 Introduction

This Learner Resource package contains all the information you need to successfully complete the learning outcomes for the module NTE005 "Regulatory Framework 2" – CPR (Open). It also contains

- Activities
- Self help questions
- A list of things you will need
- References to other useful learning resources

This module introduces the learner to the requirements detailed in Standards Australia Communications Cabling Manual (CCM). This module is normally conducted on a face-to-face basis in a classroom environment.

This module aims to provide learners with knowledge of ACA/ACIF's requirements, rules and regulations governing the installation of voice cabling systems in domestic and commercial premises. It includes mandatory legislation and regulations covering the telecommunications industry within federal, state, local government and voluntary codes of practice, which are directly related to the telecommunications industry. Other regulations covering a wide range of topics such as the environment, occupational health and safety, fire and building regulations are also included.

The Learner Resource contains information relating to the installation of customer cabling. It also has learning activities and review questions. These will help learners to understand the regulatory requirements for the installation of voice cabling in domestic and commercial premises

While this module examines the requirements of the Standards Australia Communications Cabling Manual it does not remove the learner's responsibility to read this document thoroughly.

As this learner resource is a compilation of both NTC004 and NTC005 from the Telecommunications Training Package (ICT97) Cabling Stream, the contents are generous, trainers will need to ascertain the depth of coverage when considering delivery to learners.

The predominant matter to consider will be the existing level of knowledge of the learners. These may be categorized as no experience, some experience and a high level of experience.

1.1 What you will need

The following resources and materials are essential for the learning covered in this module. In some cases the learner will only need to have access to the resources and may not be required to purchase them.

Written resources

- Module NTE005 Learner Resource Book.
- Standards Australia Communications Cabling Manual (essential).

NOTE: Due to the upgrade of AS/ACIF S008 & AS/ACIF S009, some references in Module 1 HB243:2000 & Module 2 HB29:2000 of the CCM may not be correct.

- Cable manufacturers' information and brochures.
- AS 3000:2000 Wiring Rules (Electrical)
- Building Codes of Australia
- Sample of Telecommunications Award and/or Certified Agreements
- Copies of relevant state legislation covering:
  - Environmental protection
  - Heritage buildings and sites
  - Occupational Health and Safety
  - Fire regulations
  - Copies of joint use agreements

NOTE: Some standards and codes required for Activities in this module may be able to be accessed online at TAFE or local libraries.

Hardware

- Access to various cabling products.
- Access to telecommunications distributors and records.

1.2 Using this Training Resource

The icons located in the left margin of this guide indicate an action to be taken or a resource to be used at this stage. Below is a description of their meanings.

Read
You must read the text material.

Write
You must write down a response or answer.

Resources
Manuals, texts or tools you will need to complete this section.

Self help question
These are questions designed to test your knowledge of the subject.

Activity
These are activities designed to improve your knowledge of the subject.

Case study
This indicates a case study you will need to read. Case studies may be used for role-plays or to work through and answer a series of questions.

Answers to self help questions
The answers to the self-help questions are located in the last section of this workbook.

1.3 Learning Outcomes

The following Learning Outcomes detail the necessary skills and knowledge you need to complete this module and the requirements detailed in Standard Australia Communications Cabling Manual (CCM). Each of the Learning Outcomes must be achieved to successfully complete this module.

1.3.1 Learning Outcome 1

Describe the responsibilities of the (ACA) Australian Communications Authority under the Telecommunications Act (current), for customer premises cabling and cablers.

Assessment Criteria

1.1 State the responsibilities of the ACA for customer premises cabling and cablers for health, safety and network integrity

1.2 Explain the role of the ACA appointed Cabling Registrars, Cabling Auditors and Inspectors in implementing ACA responsibilities

1.3 Explain the role of the Cabling Provider Rules in implementing ACA responsibilities for customer premises cabling and cablers

Assessment Methods Written short answer test

1.3.2 Learning Outcome 2

Describe the operation of the Cabling Provider Rules (CPR's)

Assessment Criteria

2.1 Outline the mandatory registration requirements as per ACA/ACIF for cabling work (Open)

2.2 Outline the voluntary registration requirements as per ACA/ACIF for cabling work (Open)

2.3 Describe the method of registration and the prerequisites for registration

2.4 State who are the cabling registrars

2.5 Explain where security, data and the fire alarm cabling come under CPR's

2.6 Explain the role of the wiring rules, labelling notice and cabling record maintenance in the CPR's

2.7 Explain the role of supervisors in implementation of the CPR's

2.8 Explain how complaints about the CPR implementation are handled

Assessment Methods Written short answer test

1.3.3 Learning Outcome 3

Describe the mandatory ACA customer premises requirements of Technical Standard TS008 (or its replacement).

Assessment Criteria

3.1 Describe the role of labelling and component compliance with TS008 (or its replacement)

3.2 Identify installation techniques/precautions necessary to ensure that component compliance with TS008 (or its replacement) is not compromised by cabling installation/maintenance activity

3.3 State the labelling requirements for Customer Equipment which indicate ACA compliance for connection to a carrier's network

Assessment Methods Written short answer questions

Written short answer test

1.3.4 Learning Outcome 4

Describe the general conditions for cabling installations as stated in Technical Standard TS009 (or its replacement)

Assessment Criteria

4.1 State the meaning of the abbreviations and definitions used in communication cabling

4.2 State the general conditions for cabling

4.3 Explain the conditions for the installation of Customer Distribution / Building Distribution and the carrier responsibilities

4.4 State the installation requirements for Internal cabling

4.5 Outline the installation requirements for External cabling

4.6 State the installation requirements for telecommunication earthing

Assessment Methods Refer to **Assessment Conditions (Section 1.4)**

Written short answer questions

Written short answer test

1.3.5 Learning Outcome 5

Demonstrate knowledge of the miscellaneous regulations pertaining to customer premises cabling.

Assessment Criteria

5.1 State the approvals process and describe cabling techniques appropriate for heritage buildings

5.2 Describe cabling techniques necessary for compliance with maintenance of the fire stopping requirements of AS3000 and the Building Code of Australia

5.3 List the approvals required and procedures involved in road and pavement openings for underground cable installations and aerial cable erection, in a public place

5.4 State the limitations imposed on cabling activities by noise restriction/abatement by-laws

5.5 Describe "hazardous areas" in relation to cabling installations and procedures and techniques required for cabling in such areas

5.6 Outline industrial regulations / awards applicable to the Telecommunications industry

Assessment Methods

Structured questions

Case Studies

1.4 Assessment Conditions

The assessment for Learning Outcome 4 of this module must comply to the following Australian Communications Authority's directive:

1. The Assessment must be an examination paper containing 50 multiple choice questions, selected from topics within Technical Standard AS/ACIF S009:2001 as listed below.
2. The examination is to be conducted as an **"open book"** examination using the technical standard for a maximum period of 1 hour 15 minutes.
3. The examination paper minimum pass mark is 80%.
4. No person can be RPL'ed against this module.

NTE005 Regulatory Framework 2: Topics for Examination.

Min No. of Questions	Topics for Examination
4	General definitions
1	Mandatory or Recommended – understanding the difference
2	Network Boundaries – types or significance
2	Network boundary distributor jumpering
4	Network boundary distributor requirements – clearances, locations, accessibility, cross connections etc
2	NTD & NTDE requirements
1	Connection to a carrier's network
1	Lead-in cabling – responsibilities, support
4	Distributors – locations, records, outdoors, construction, clearances etc
1	Integrity of the network – hazardous and harmful services etc
1	Registration/Licensing, supervision
1	Earth Potential Rise – avoiding EPR locations and low frequency induction
1	Exemptions for optical fibre installation
1	Cabling in explosive atmosphere and hazardous locations
1	Catenary support systems
2	Cable terminations, single insulated or bare conductors – separations from power terminations and cabling
5	Indoor cabling – type, separations, support systems, damp situations, jointing etc
4	Underground cabling – type, separations, conduit, jointing etc
3	Aerial cabling – type, separations, heights etc
1	Surge suppression
6	Earthing systems, CES, TRC, and PE (Types, uses, bonding, sizes, colour, labeling etc
Total 48 + 2	Plus 2 questions from any of the above topics = **50 questions**

Section 2 Telecommunications and related standards

2.1 Introduction

Purpose
The aim of this section is to develop your awareness of Australian and International standards and the Building Code of Australia and to relate these standards to the Telecommunications industry.

Objectives
At the end of this section you will be able to:

- Outline the role of Standards Australia and its standards and the role of International Standards related to cabling
- Outline the role of the ACA and its standards
- Describe the Building Code of Australia
- Outline the role of NATA calibration as it relates to measuring instruments and test equipment

Resources
The following resources are required to complete this section:

- Communications Cabling Manual
- Building Code of Australia

2.2 Overview

In the telecommunications industry, as in all other technical industries, standards are adopted to ensure that the systems and equipment developed are of the highest quality and reliability. In Australia, a series of standards has been developed relating to the telecommunications industry, some of which are **mandatory** and some of which are **voluntary**.

Of these standards, some have been developed in Australia while others have been adapted from international standards. There are also other non-industry-based standards that may affect the telecommunications cabler.

In this section you will explore some standards that may affect a telecommunications cabler and learn about those standards associated with cabling.

2.3 Australian Standards

Standards Australia is an independent not-for-profit Organization, established in 1922. It operates formally under a Royal Charter as the Standards Association of Australia (trading as Standards Australia) and has recognition as the peak standards body in Australia through a memorandum of understanding with the Commonwealth Government.

Its main function is to prepare, publish and promote the use of Australian standards as a national benchmark for products and services so as to enhance quality of life and industry efficiency.

By bringing together a number of interested parties including manufacturers, industry players, suppliers of services, government bodies, professional associations and consumers a voluntary consensus process is used to set draft standards. These are then distributed to all interested parties (for further comment), before final acceptance. This process is an on-going one and is subject to constant amendments and reviews.

Australian Standards always start with the letters 'AS'. In some cases standards are jointly produced by Standards Australia and Standards New Zealand (due to an active cooperation agreement) and start with the letters 'AS/NZS' eg. AS/NZS 3260 is a telecommunications safety standard.

Standards Australia and Standards New Zealand are also responsible for ensuring that the Australian and New Zealand viewpoints are considered in the formulation of international standards and that the latest international experience is incorporated in national and joint standards. This role is vital in assisting local industry to compete in international markets. Both organisations are members of the International Organization for Standardisation (ISO) and the International Electrotechnical Commission (IEC).

2.4 Australian Communications Authority (ACA)

The Australian Government considers the Telecommunications industry of strategic importance to both the Australian manufacturing and service industries. Because of this on the 25 May 1988 the Australian Government released a policy statement outlining a new framework for telecommunications services.

This new framework was distributed widely to industry, associations, consumer groups, other government bodies' etc. for comment. These new arrangements were part of a process to bring about major structural adjustments and to make the Australian communications industry more efficient, profitable and competitive, particularly in the longer term.

To bring about these goals regulatory arrangements introduced into the Telecommunications Act 1989 and reaffirmed in the Telecommunications Act 1991 separated the technical and regulatory functions of the then carrier TELSTRA. The regulatory functions were made the responsibility of an independent statutory body known as AUSTEL. AUSTEL was also made responsible for consumer protection, fair competition in the industry and monitoring of the efficiency and adequacy of services provided by the carriers. The changes to the Telecommunications Act 1991 also gave AUSTEL extended powers and functions. The most important from a cabler's point of view was the requirement for the licensing of cable service providers.

The Act in short said 'AUSTEL will provide licenses to people engaged in the supply, installation and maintenance of customer cabling that connects to telecommunications networks'. These licensing provisions assist in this fair and open competition, and ensure adherence to AUSTEL's Technical Standards'.

The Act was amended in 2000 to include changes to the licensing system. Cabling Provider Rules (CPR) was introduced to replace the BCL & RCL licensing system. All installers working in the security, fire & data industries are required to be registered as a cabling provider from the 3rd October 2000.

On the 1 July 1997 AUSTEL merged with the Spectrum Management Agency (SMA). The SMA was the Australian Commonwealth statutory agency responsible for the management of radio communications in Australia. The new regulatory body is now known as the Australian Communications Authority (ACA). The ACA's main functions are now technical regulation and licensing of telecommunications and radio communication in Australia. The administration of competition regulation was transferred to the Australian Competition and Consumer Commission (ACCC).

2.5 The role and function of the Australian Communications Authority (ACA)

The Federal Government established the former regulator 'AUSTEL' in July 1989. AUSTEL's role was to supervise the introduction of competition in the Australian Telecommunications industry. AUSTEL was **not** a supplier of telecommunications products or services.

The Federal Government's decision was to offer all Australians a greater choice in telecommunications products and services. AUSTEL supervised the initial transition to full competition in order to enable consumers to derive the full benefits of greater choice.

Consumers are free to choose which telephone equipment they want to use. They can choose whether to rent from a carrier or buy their own telephone.

Competitive issues are now the responsibility of the Australian Competition and Consumer Commission.

The following information has been downloaded from the ACA website http://www.aca.gov.au

2.5.1 The ACA — a regulator for the communications industry

Our vision... An efficient, competitive and increasingly self-regulated communications sector, which meets the needs of the Australian community.

Established in July 1997 within the portfolio of Communications, Information Technology and the Arts as a regulator of radiocommunications and telecommunications, the ACA's roles include management of the radio frequency spectrum, promotion of industry self-regulation and other significant consumer responsibilities.

The ACA's functions are designed to encourage and assist industry and consumers to take advantage of the opportunities presented by current and future technologies, while providing safeguards for consumers.

The ACA was established under the Australian Communications Authority Act 1997,and exercises powers under the Telecommunications Act 1997, the Radiocommunications Act 1992 and other related legislation.

Funded through the Federal Budget, the ACA collects substantial revenue on behalf of the Commonwealth. The ACA's budget for 2000–01 is $55 million and estimated regular revenue collection for 2000–01 is $174 million, not including non-regular revenue such as that raised from spectrum auctions. Revenue is collected through telecommunications carrier and radiocommunications licence fees, as well as through charges on telecommunications numbers, which alone generate $60 million per annum.

A significant amount of revenue has recently been raised through auctions of spectrum licences. The radio frequency spectrum is a finite resource that has become more valuable with the rapid development of mobile telecommunications. In 1999–00 the ACA raised total revenue of $1.5 billion, of which more than $1.3 billion was from the auction of spectrum licences in the 1.8GHz band, which is suitable for mobile phone networks. In 2000–01 some significant spectrum auctions were held, including the sale of spectrum licences that will be used to provide third generation (3G) mobile phone services. The sale price for this 3G spectrum was $1.168 billion.

The ACA provides a direct service to more than 100,000 clients, from private individuals applying for radiocommunications licences to major international corporations.

2.5.2 Functions and responsibilities

Main functions of the ACA...

- Manage access to the **radiofrequency** spectrum through radiocommunications licensing
- Resolve competing interests for spectrum through **price-based allocation** methods
- Investigate and assist in resolving radiocommunications **interference**
- Licence **telecommunications carriers** and ensure compliance with licence conditions and carriage service provider rules
- **Administer legislation** relating to powers and immunities of carriers in constructing telecommunications facilities
- Regulate **industry compliance** with mandatory standards and voluntary codes of practice
- **Represent** Australia's communications interests internationally
- Maintain and administer the Telecommunications **Numbering Plan**
- Monitor compliance with **consumer safeguards** and service guarantees
- Administer **universal service** initiatives
- Report on **telecommunications** industry performance
- **Provide information** about communications regulation for industry and consumers

2.5.3 Codes and standards

One of the ACA's major roles is to work with the communications industry in developing self-regulation through industry codes and standards, and to:

- Register codes and enforce compliance with registered codes where necessary; and
- Determine and enforce mandatory industry standards when suitable voluntary codes are either inappropriate or not developed.

Under industry-agreed arrangements, the codes are developed by the Australian Communications Industry Forum, in close consultation with the ACA, industry and the community, and cover operational as well as consumer matters. There are now registered codes covering issues such as billing, calling number display, complaint handling, protection of personal information, and consumer information on prices, terms and conditions.

The ACA may also set mandatory technical standards where necessary to:

- Minimise radiocommunications interference;
- Avoid disruption to telecommunications networks;
- Ensure interoperability of the standard telephone service; and
- Protect public health and safety.

The ACA investigates interference complaints and audits equipment and cabling to ensure compliance with technical standards.

In developing regulatory standards, the ACA consults widely with the industry and the community through its biannual Consumer Consultative Forum and various advisory and consultative committees. There are currently eight such committees, which have industry and consumer representatives on them.

The ACA is involved in a cooperative approach for determining future regulation of exposure to electromagnetic radiation (EMR) from radiocommunications devices. While there is an existing mandatory standard, a new limits-based EMR standard is being developed by the Australian Radiation Protection and Nuclear Safety Agency, and the Australian Communications Industry Forum is developing a code of practice for communications facilities.

The ACA oversees compliance with electromagnetic compatibility (EMC) regulatory arrangements, which aim to minimise interference between electronic products. Interference may reduce their performance or disrupt essential communications. With the rapid growth in electronic systems and digital technology for commercial and domestic use, this is becoming increasingly important.

The EMC regulatory arrangements are mandatory for suppliers of an extensive range of commercially available products. The arrangements set out limits for electromagnetic emissions from electrical and electronic products. Suppliers must demonstrate that their products meet relevant standards before the products are placed on the market.

2.5.4 International communications

The rapidly changing nature of communications and rapid growth of the industry worldwide has led to increasing sensitivity being attached to international communication issues. The ACA has a primary role in representing Australia's interests in discussions about such issues..

Australia is taking a lead in Asia–Pacific forums convened to promote mutual recognition, harmonise standards and enhance prospects for trade in equipment and services. Such international cooperation benefits manufacturers and suppliers of equipment, as well as users, by reducing administrative requirements and making it easier to export and import communications equipment. It can provide access to new markets for local industry, and enable consumers to benefit from competitive imports.

A Mutual Recognition Agreement recently implemented in our region on assessment of telecommunications equipment has participation from nineteen Asia-Pacific Economic Cooperation (APEC) member countries.

As well as working through regional forums such as APEC and the Asia-Pacific Telecommunity, the ACA represents Australia's communications interests internationally by:

- Coordinating and leading Australia's representation at the International Telecommunication Union (ITU), including developing Australian and regional proposals; and
- Contributing to revision of ITU radio regulations and preparing Australian proposals for the World Radiocommunication Conference, which is held every two or three years.

Australia's objective at the last World Radiocommunication Conference, held in 2000, was to promote international agreements for efficient and effective access to radiofrequency spectrum.

ACTIVITY – Look at the ACA's website at www.aca.gov.au and locate:

- Any information that relates to communications cabling and licensing/registration.
- How many carriers' licences have been issued?
- If you do not have access to the internet contact your instructor for further information

2.6 International Standards (ISO, IEC & ITU)

The production of Australian and ACA standards is not just done on a local, or for that matter on a national basis. Because the telecommunications industry is a global business (e.g. calls need to be made internationally) there are a number of international organisations that have been formed to help facilitate international standardisation.

Three of the most important organisations in terms of the telecommunications industry are:

- International Organisation for Standardisation (ISO).
- International Electrotechnical Commission (IEC).
- International Telecommunications Union (ITU) – Telecommunication Standardization Sector (formally CCITT).

Standards Australia, ACA or other government bodies represent the Australian Telecommunications industry on all three organisations. Other foreign organisations also contribute to telecommunications standardisation, the most important of these being the Electronics Industry Association (EIA) and the

Telecommunications Industry Association (TIA) of the USA. Together these organisations have produced a number of standards relating to telecommunications commercial building standards (eg. EIA/TIA 569). In general, international standards where necessary are adopted by Standards Australia and the ACA and given an Australian number e.g. AS/NZS 3080 is based on ISO/IEC 11801.

2.7 The Building Code of Australia (BCA)

The BCA is a uniform set of standards (including technical requirements) covered by legislation, for the design and construction of buildings and structures throughout Australia and its territories. It allows for variations in climate and geological or geographic conditions.

It is produced and maintained by the Australian Building Codes Board (A.B.C.B.) on behalf of the Commonwealth, state and territory governments. The A.B.C.B. is established by agreement between the Commonwealth Government and each State and Territory Government. It is a cooperative arrangement between the signatories listed above, Local Government and the building industry and is published in conjunction with CCH Australia Limited.

The goals of the BCA are to enable the achievement and maintenance of acceptable standards of structural sufficiency, safety (including safety from fire) health and amenity for the benefit of the community now and in the future. These goals are applied in such a way that the BCA extends no further than is necessary in the public interest, is cost effective, easily understood and are not needlessly onerous in its application.

Typical subjects covered include building structure, fire resistance, access and egress, fire fighting and smoke detection equipment, mechanical ventilation, lift installations and certain aspects of health and amenity.

The BCA does not directly apply to the technical details of services, such as telecommunications cabling. Cabler's, however, should be aware of building codes particularly those relating to fire safety, structural integrity and the correct location of distributors etc. In some cases knowledge of the building codes will make it easier to hide cables, or to run them in a cost-effective manner.

The BCA is updated on an on-going basis with amendments sent to subscribers by mail.

2.8 National Association of Testing Authorities (NATA)

NATA was chosen by the ACA to provide accreditation for telecommunications testing laboratories. It is a national body with international ties to other accreditation authorities.

NATA assesses the laboratory and its testing officers against recognised national and international standards. They do this by reviewing the quality systems put into place by the laboratory, making sure that test gear is calibrated annually and by examining the testers skills and knowledge of the standards (to which he/she has been accredited to test). When a laboratory has been granted accreditation biannual reviews of both the laboratory and staff and random spot checks ensures that the highest standards are always adhered to and that the laboratory has the ability and competence to carry out the required tests.

All laboratories that wish to test telecommunications cable, cabling products or customer equipment for compliance against the ACA Standards (eg. Customer equipment to AS/NZS3260, TS002, 003 & 004) must have NATA accreditation.

A manufacturer cannot place an A-tick or C-Tick mark on Customer Equipment (CE) (except under special circumstances) unless a NATA accredited lab (or an overseas equivalent laboratory.) has issued a compliant 'test report' for that product. One area where Cabler's may directly require the services of a NATA accredited Laboratory is when having telecommunications test equipment calibrated for accuracy.

2.9 Other Commissions Associations, Forums and Groups

2.9.1 Australian Competition and Consumer Commission (ACCC)

The ACCC was formed on 6 November 1995 with the merger of the Trade Practices Commission (TPC) and the Prices Surveillance Authority (PSA). Under its own act and the Telecommunications Act 1997, the ACCC prevents anti-competitive and unfair market practices from taking place, mergers or acquisitions of companies that may stifle competition, price fixing or unfair pricing, product safety recalls and grants third party access to facilities of national significance.

2.9.2 Australian Communications Industry Forum (ACIF)

The Australian Communications Industry Forum (ACIF) is an industry initiative whose primary role is to manage the self-regulation processes in Australian communications. It is funded by an unrestricted membership and consists of an Advisory Assembly, five expert reference panels and a series of working groups. The ACIF is charged with developing the ACA Technical Standards service specifications and codes of practice required to ensure open competition and real benefits to the end user. ACIF also plays a leading role in ACA cabler licensing & registration issues.

Licensing administration for holders of BCL & RCL has been contracted by the ACA to the National Electrical Contractors' Association (NECA) Teledata License Pty Ltd. Under the latest Cabling Provider Rules the registration of cablers for Open, Restricted & Lift Registration is handle by a number of organisations listed below. An up to date listed of ACA accredited CPR registrars and their contact details are available from the ACA web site – www.aca.gov.au

- Australian Cabler Registration Service (ACRS)
- Australian Security Industry Association Limited (ASIAL)
- BICSI Registered Cablers Australia Pty Ltd (BRCA)
- Fire Protection Association Australia (FPA Australia)
- TITAB Australia Cabler Registry Services (TITAB ACRS)

2.9.3 Other, Miscellaneous Groups

1. Australian Telecommunications User Group (ATUG)
2. Consumers' Telecommunications Network (CTN)
3. Small Enterprise Telecommunications Centre (SETEL)
4. Australian Consumers' Association (ACA)
5. Information Technology and Telecommunications Industry Training Advisory Board (IT&T ITAB)

2.10 Self help questions

1. Which Standard is mandatory for all telecommunications cable installations?

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2. What is a generic cabling system?

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3. Which overseas standard is used as a base for AS/NZS 3080?

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4. Who is responsible for producing and maintaining the Building Codes of Australia?

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5. What do the following acronyms stand for?

a) TIA

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b) ISO

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c) IEC

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d) EIA

Section 3 Using the Communications Cabling Manual

3.1 Introduction

Purpose

To develop knowledge of the history of the Communications Cabling Manual and the layout of it's content.

Objectives

At the end of this section successful participants will be able to:

- Outline the layout of the Communications Cabling Manual.
- Briefly describe the plan of the various sections within the Communications Cabling Manual.
- Briefly describe the format of the Technical Standards.

Resources

The following resources are required to complete this section:

- Standards Australia Communications Cabling Manual
- NTE005 Learner Resource

3.2 History of the cabling manual

In 1962 the Postmaster General's Department (PMG) (the government department responsible for telephony and postal services) introduced the concept of cabling contractors. The PMG at the time produced two specifications, covering areas such as:

- Cabling of Buildings for Telephone Services; and
- Skirting Ducts and Enclosures for Australian Post Office Telephone Services.

These specifications were the 'Standard' for cabling installations performed by registered cabling contractors and PMG staff. During the period between 1962 and 1984 the PMG (and then Telecom Australia) designed, authorised, inspected and approved cabling installations based on the content of these specifications.

Rapidly changing technology, changing building construction methods and an increased registered cabling contractor activity caused Telecom to review these specifications in 1984. The completion of the review in 1985 saw the development of a 'National' telecommunications wiring standard.

Introduction of this standard to the cabling industry was by a series of item specific documents. The principal documents in this series were:

- TPH 1754 - Earthing Practices;
- TPH 1755 - Accommodation Guidelines; and
- TPH 1756 - Cabling Installation Practices.

Other related documents covered such areas as cabling design and planning principles, facility cabling installation practice and acceptance testing guidelines.

These previous documents provided the basic reference for the original AUSTEL Customer Premises Cabling Manual (CPCM). The CPCM (released in July 1990) was the result of a review of existing technical standards.

AUSTEL commissioned this review, which resulted in a range of revised technical standards addressing the specific needs of the telecommunication's industry.

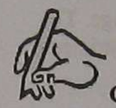
As a result of the next step towards industry self regulation that occurred on 1 July 1997, the CPCM was transferred from AUSTEL to Standards Australia. Their vision is to further develop the "Manual" from being a regulatory document into an industry resource. As a result in April 1998, Standards Australia published the "Communications Cabling Manual"(CCM) in two formats:

- The Base General Premises Cabling Licence (BCL) package, and
- The Restricted Cabling Licence (RCL) package.

The Communications Cabling Manual - BCL Package provided information relevant to cabling installations within a customer's premises. The CCM consisted of two volumes containing seventeen parts. Volume 1 contains parts 1-7, 9 & 99 that were specific to the CCM and Volume 2 contained published standards and handbooks relevant to the cabling industry. The information in the Manual was in two forms:

- Instructions explaining how to install cables and cabling components within the customer's premises; and
- Technical standards specifying equipment and cabling requirements.

In December 2000 the CCM was updated to reflect the changing ACA requirements for cabling licensing. The current version of the CCM is available in a number of different packages and all information is contained in the one volume.
Visit the Standards Australia website to find out more info on the CCM packages;
http://www.standards.org.au/



Complete the following statements.

1. In 1962 the ..... introduced the concept of telephone cabling contractors and with it a set of.....
2. Telecom reviewed these in .....
3. The .....was the result of wide ranging review of technical standards.

3.2.1 The Communications Cabling Manual (CCM)

The earlier AUSTEL technical standards that went to make up the now superseded AUSTEL Customer Premises Cabling Manual (CPCM) were largely based on TELSTRA (TELECOM) standards (formally known as Regulatory standards).

However, to meet today's industry requirements, Standards Australia and the ACA have looked at the International telecommunications standards and have largely replaced, upgraded or revamped most of these earlier AUSTEL technical standards. To reflect these changes they have issued a new cabling manual known as the Communications Cabling Manual (CCM).

The new CCM consists of a number of individual Australian Standards, Australian Communications Industry Forum (ACIF) technical standards eg. AS/NZS 3080, AS/ACIF S008:2001 and AS/ACIF S009:2001. Standards Australia's Communications Technologies Group have prepared the CCM. This has been done in consultation with an industry-based advisory panel representing carriers, cable manufacturer's, cabler's and end users.

The CCM is designed to provide essential information to the communications industry (in particular installers), it was formerly available in two configurations, ie. BCL package and RCL package. The current version of the CCM is supplied in one configuration, which covers both Open & Restricted classes of registration.

The Base General Premises Cabling License (BCL) package contained every significant communications document/standard that Standards Australia produced. The Restricted Cabling License (RCL) package was especially tailored to the needs of the RCL holder only. Both packages were based on a number of individual Australian Standards and Australian Communications Authority (ACA) technical standards.

The current version of the CCM is separated into 3 modules and includes changes to reflect the move to Cabling Provider Rules and registration instead of the previous license arrangements.

3.2.2 Organisation of the Communications Cabling Manual

The Manual assumes that the reader has a sound understanding of the technical terms used. Standards Australia believes that apart from these technical terms the text is in a clear and simple-to-understand format.

All ACIF Technical Standards specify two categories of performance. These are: -

- **Mandatory** requirements identified by the word **'shall' or 'shall not'**. Mandatory requirements are the absolute minimum acceptable parameters.
- All other provisions are **Voluntary.** (Voluntary parts are recommendations only).

The current version of the Communications Cabling Manual is separated into three modules:

- **Module 1:** Australian regulatory arrangements HB 243 – 2000
  This handbook provides essential regulatory information to industry in order to assist installers and others to comply with the requirements of the Telecommunications Act 1997 (the Act). In particular, this Handbook gives advice on Cabling Provider Rules, which came into effect on 3rd October 2000.

- **Module 2:** Communications cabling handbook HB 29
  The objective of this Handbook is to supplement the information in the above Standards with explanatory material, practical details and generally useful information in order to assist installers and others in the field. It also includes relevant extracts from AS/ACIF S009:2001.

- **Module 3:** Relevant standards
  - Regulatory standards
    - AS/ACIF S008:2001 (Requirements for Authorised Cabling Products)
    - AS/ACIF S009:2001 (Wiring Rules) [or their replacements]
  - Voluntary Standards (AS/NZS 308X series)

3.2.3 ACA Technical Standards

ACA Technical Standards are usually derived from input from working groups and prepared under the guidance of the ACA's Standards Advisory Committee. Working groups are largely comprised of members that go to make up, or have a vested interest in the telecommunications industry. The inside covers of ACA Technical standards always lists the organisations that are represented on these working groups. Any references to other standards used to make up the ACA Technical Standard eg. Other ACA, Australian and International standards are usually listed at the back of the standard. The standards are then issued in draft form for industry approval and distributed in their final form by Standards Australia.

The Australian Communications Authority (ACA) licensing scheme protects the integrity of the telecommunications network and the safety of personnel. This is possible by ensuring licensed cablers have a minimum uniform standard of knowledge, based on current technical standards.

The current technical standards AS/ACIF S008:2001 and AS/ACIF S009:2001 have replaced the previous ACA Technical Standard TS008 and the Austel Technical Standard TS009.The current standards were developed under a Memorandum of Understanding between the ACA and the Australian Communications Industry Forum (ACIF). Both standards are a result of a consensus among representatives on the ACIF Working Committee to produce them as Australian Standards.

From a cabler's point of view, the two most important Technical Standards are:

- AS/ACIF S008:2001 Requirements for Authorized Cabling Products.
- AS/ACIF S009:2001 Installation Requirements for Customer Cabling (Wiring Rules).

The requirements in AS/ACIF S009:2001 are limited to:

(a) Protecting the integrity of a telecommunications network or facility; and

(b) Protecting the health and safety of persons

The requirements in AS/ACIF S008:2001 are limited to:

(a) Protecting the integrity of a telecommunications network or facility;

(b) Protecting the health and safety of persons

(c) Ensuring access to emergency services: and

(d) Ensuring interoperability with a standard telephone service.

The Communications Cabling Manual (CCM) includes full editions of AS/ACIF S008:2001, and AS/ACIF S009:2001. Standards Australia publishes the Communications Cabling Manual, which includes an update advice service. Copies of the Manual are available by mail order or can be purchased personally from any office of Standards Australia.

Note:

The ACA media release No. 68 (21/12/01) advises that the new AS/ACIF S008:2001 will operate in parallel with the ACA TS008 for a period of two years.

The new AS/ACIF S009:2001 will take effect immediately, as of 21/12/01.

It is the cabler's responsibility to obtain any current updates of the technical standards.

3.2.4 AS/ACIF S009: 2001

It is important to understand at this stage that AS/ACIF S009:2001 (Wiring Rules) is separated into a number of different sections. The successful completion of learning outcome 4 of this module is not dependent only on knowing the contents of the standard but where to find the information contained in the standard quickly. The following outline of the standard is provided to assist in understanding what is covered by each section of the standard.

Foreword	An introduction to the standard and its application.
Content	Details what is in the standard.
Section 1 – Interpretation	Guidance notes for understanding the standard.
Section 2 – Scope	What is covered by the standard.
Section 3 – References	All the subordinate references called up in the standard. These become part of the standard.
Section 4 – Abbreviations and Definitions	Explains all the critical abbreviations and definitions used in the standard.
Section 5 – Requirements	This section contains all the details of the wiring rules.
5.1 General	A general coverage of all areas in Section 5. This is then expanded in the following section.
5.2 Distributors	Requirements of distributors in general
5.3 Network Boundary	A description of the requirements for distributors used at the network boundary, this includes NTD's.
5.4 Indoor Cabling	Details for installing indoor cabling. Includes separations, cabling support, damp situations and under carpet wiring.
5.5 Outdoor Cabling	Details for installing outdoor cabling. Includes surface, underground and aerial cabling requirements.
5.6 Earthing	Provides details for the three telecommunications earthing systems: CES, TRC and ELV DC. Also covers details such as cable size, earth bars and terminals, cable joints and couplings. Also covers requirements for telex earthing and the use of TFEE when required. Earthing requirements for metallic frames, backmounts, enclosures and cable support systems. Surge suppression devices are also covered. Informative tables and diagrams on the various earthing systems installed.

Appendix A	Covers access clearances for NTD enclosures and network boundary distributors.
Appendix B	Covers Direct Current in the communications bonding conductor.
Appendix C	Covers current limited power feeding in network cabling.

3.2.5 AS/NZS 3080 Series of Standards

The AS/NZS 3080 series of standards were designed to provide cabler's and other industry workers with guidance for planning, designing, installing, testing and administering *generic* telecommunications services. By using the term generic we mean a system that will support a multi - product, multi - vendor environment and a system that is capable of conveying all types of information such as voice, data, text, images and video.

The first standard in the series, AS/NZS 3080:2000 - Integrated Communications Cabling Systems for Commercial Premises, defines generic cabling systems for commercial buildings.

This standard is based on and reproduced from an international standard, ISO/IEC 11801:1985, Information Technology-Generic Cabling for Customer Premises. Other standards in this series were:

- AS/NZS 3081 Telecommunications Installations - Twisted Pair Cables for Telecommunications Applications
- AS/NZS 3082 Telecommunications Installations - Optical Fibre Cables for Telecommunications Applications
- AS/NZS 3083 Telecommunications Installations - Coaxial Cables for Telecommunications Applications
- AS/NZS 3084 Telecommunications Installations - Telecommunications Pathways and Spaces for Commercial Buildings
- AS/NZS 3085 Telecommunications Installations - Administration of Communications Cabling Systems - Basic Requirements

The AS/NZS 3080 series of standards now form part of the Communications Cabling Manual. AS/NZS 3081, 3082 and 3083 are not included in the Communications Cabling manual as they are now considered to be out of date with the upgrading of TS009 in 1997.

The current AS/NZS 3080 series of standards contained in the CCM are listed below;

- AS/NZS 3080:2000 Telecommunications Installations – Integrated telecommunications cabling systems for commercial premises.
- AS 3084:1993 Telecommunications Installations –Telecommunications Pathways and Spaces for Commercial Buildings
- AS/NZS 3085.1:1995 Telecommunications Installations - Administration of Communications Cabling Systems – Part 1: Basic Requirements
- AS/NZS 3086:1996 Telecommunications Installations –Integrated telecommunications cabling systems for small office/home office premises.
- AS 3087: 2000 Telecommunications installations – Generic cabling systems – Specification for the testing of balanced communication cabling in accordance with values set out in AS/NZS 3080:2000

Complete the following Activity.

3.3 Activity 1 - Standards

Using the scopes found in AS/NZS 3080, 3084, 3085.1, 3086 & 3087 write a brief summary of what the following standards cover.

1. AS/NZ 3080

2. AS 3084

3. AS/NZS 3085.1

4. AS/NZS 3086

5. AS/NZS 3087

6. Examine AS/ACIF S008:2001 and write in your own words what type of equipment or components this standard covers.

7. Using the scope in AS/ACIF S009:2001, write a brief summary as to what this standard covers.

3.4 Important Terminology

As you work through this workbook you will need to understand various definitions and important telecommunications terminology used in the CCM.

A list of definitions and abbreviations defining words used in the telecommunications industry is provided in Section 4 (page 9) of AS/ACIF S009:2001. Any Technical Standard will include a definition section defining terms used in that standard. AS/ACIF S008:2001 has a list of abbreviations & technical definitions in Section 4 (page 7).

ACTIVITY

Complete the following exercises. These exercises require you to find the definitions of important technical terms.

1. Summarise the definition of a Customer Switching System (CSS)

2. Summarise the definition of a 'first socket'

3. Summarise the definition of Safety Extra Low Voltage (SELV)

4. Summarise the definition of a distributor

3.5 Self Help Questions

Q1 The body responsible for monitoring the conduct of telecommunications licence ho lders is:

(a) Telecommunications Ombudsman

(b) Australian Communications Authority

(c) Department of Transport and Communications

(d) Australian and Overseas Telecommunications Corporation

Q2 The body responsible for setting standards for cabling practice in 1962 was:

(a) Australian Telecommunications Authority

(b) Aussat

(c) Department of Transport and Communications

(d) Postmaster General's Department

Q3 A national telecommunication wiring standard was released:

(a) In 1962 by the PMG

(b) In 1970 by DOTAC

(c) In 1985 by Telecom

(d) In 1989 by AUSTEL

Q4 The current national telecommunication wiring standards are found in:

(a) The telecommunication wiring rules

(b) The Communications Cabling Manual

(c) Telecommunication technical standards

(d) Cabling installation practices

Q5 The current telecommunications standard known as the 'Wiring Rules' is:

(a) AS/ACIF S006:2000

(b) AS/ACIF S002:2000

(c) AS/ACIF S008:2001

(d) AS/ACIF S009:2001

Q6 Mandatory installation requirements are designated by the words '**Shall**' or '**Shall Not**' in all Australian Technical Standards. This means that the installation standards:

(a) Should be complied with where possible.

(b) Detail the absolute minimum mandatory requirement of the technical standard.

(c) Are recommended and should be met if possible.

(d) May be complied with only when an installation is of a type, which could be subject to an inspection.

Q7 What section of the CCM contains regulatory information to assist cablers meet the requirements of the Telecommunications ACT 1997?

(a) Module 1

(b) Module 2

(c) AS/ACIF S009:2001

(d) AS/NZS 3080:2000

Q8 What section of the CCM provides supplementary information to the standards in the form of explanatory material, practical details and other useful information?

(a) Module 1

(b) Module 2

(c) AS/ACIF S009:2001

(d) AS/NZS 3080:2000

Q9 Which of the following standards are voluntary standards?

(a) AS/ACIF S009

(b) AS/ACIF S008

(c) AS/NZS 3080

(d) AS/NZS 3084

(e) AS/NZS 3085.1

Q10 Which of the following standards are mandatory standards?

(a) AS/ACIF S009

(b) AS/ACIF S008

(c) AS/NZS 3080

(d) AS/NZS 3084

(e) AS/NZS 3085.1

Section 4 Licensing (prior to new CPR's) and the Industry Regulator

4.1 Introduction

Purpose

To develop knowledge of the classes of cabling licence available and the obligations of licensed cablers.

Objective

At the end of this section successful participants will be able to:

- Describe the Australian Communications Authority's (ACA) role under the current Telecommunications Act.
- Detail the ACA's authority under the current Telecommunications Act.
- Describe the fundamental principles pertaining to the various classes of cabling licence.

Resources

The following resources are required to complete this section:

- Standards Australia Communications Cabling Manual (CCM)
- NTE005 Learner Resource

4.2 Licensing requirements (Pre 3rd October 2000)

The following information is still relevant to the telecommunications industry in reference to cabling work. The licensing requirements were superseded by the ACA's new CPR (Cabling Provider Rules) as of 3rd October 2000. We will look at this for historical reference then go on to the next section that will cover the Cabling Provider Rules and the transitional arrangements from this superseded licensing system.

4.2.1 General

The Telecommunications Act 1997 requires a system of licensing for cabling work for which the ACA has the overall responsibility, although the day to day licensing activity is contracted out to an industry body to perform. All cablers (including staff of Telstra and Optus) who do work defined as cabling work, (under the *Act*), on a customer premises must have a cabling licence. Issue of the licence is on an individual basis.

The cabling licence allows cablers to install or maintain cabling beyond a specified point of a carrier's network. This is defined as the **Network Boundary**.

Unlicensed workers must be under the supervision of a licensed cabler when installing or maintaining cabling. The licensed cabler must provide personal on-site supervision during all stages of cabling.

Three classes of licence were available. These allowed for different types of cabling work in a customer premises. The three licences the ACA managed under the Act were:

- The Base General Premises Cabling Licence.
- The Lift Mechanics General Premises Cabling Licence
- The Restricted Cabling Licence; and

Additional licence endorsements were available for specific types of cabling as detailed below.
The General Premises Cabling Licence (this is no longer available to new applicants) was reissued, as a BCL when an existing licence holder applied for renewal of their licence and endorsements were applicable for Co-axial, Category 5 and Optical Fibre cabling.

A ***Base General Premises Cabling Licence (BCL)*** allowed the licensee to perform or supervise, all indoor cabling installation and maintenance, including customer cabling that terminated on the customer side of a CD/BD or connected to the first telephone socket terminating the carrier's lead-in cable in any type of building.
Endorsements were applicable for:

- Underground
- Aerial
- Coaxial
- Optic Fibre cabling
- Category 5 cable

A ***Lift Mechanics General Premises Cabling Licence (LPC)*** allowed the cable installer to perform limited cabling work. This work was in the immediate vicinity of a building's lift. This includes the actual lift car, the travelling cable and the connection at the cross-connect point at the outside of the lift well. Applicants for this licence had to undertake a lift cable installer's course. The Royal Melbourne Institute of Technology (RMIT) conducted this course. Applicants had to also pass an associated written examination. There were no endorsements applicable to this licence.

A ***Restricted Cabling Licence (RCL)*** allowed the licensee to perform or supervise basic indoor cabling work only in relation to a customer's premises (typically domestic and small business premises), with a maximum of two standard exchange lines that terminated directly on compliant sockets. These services were typically for the connection of simple phones, facsimile machines, answering machines and modems. The licensee could run but **not** terminate cable for higher-level services. Such services were digital cabling, certified to an installed performance level, optic fibre or coaxial cable in the premises.
Endorsements were applicable for:

- Underground
- Aerial cabling.

If a RCL cabler was to work on higher-level services, or work in premises with a BD, then a person holding a GPC/BCL with endorsements where applicable had to supervise them.

Applications for a cabling licence had to be made on the prescribed form and forwarded to the National Electrical Contractors Association (NECA) Teledata Licensing (the company contracted by the ACA to administer the licensing process).

A licence was valid for five years. Failure to renew the licence before it expired resulted in the cabler being unlicensed and having to go through the application process to gain a new licence.

4.2.2 Base General Premises Cabling Licence (BCL)

The Base General Premises Cabling Licence allowed cable installers to work and supervise others in general premises involving common cabling installations. This licence was referred to as the BCL licence.

Under the cabling licence regime the ACA required BCL licence applicants to submit a certificate or statement from an accredited provider. This statement clearly indicated successful completion of the required competency standards and specific *cabling technical standards* module(s). In this training system trainees had to satisfy learning outcomes specified by industry. Competency standards and training curriculum clearly define these outcomes. Workplace assessors assessed trainees against these standards in the workplace. It was possible, in some specialised areas, to undertake this in suitable simulated work environments.

Cablers required licence endorsements for specialist installations involving:

- Underground cabling;
- Aerial cabling;
- Coaxial cabling;
- Optical fibre cabling; and
- Category 5 cabling.

Applicants could only obtain specified endorsements after additional training and subsequent assessment against the national competency standards. This training could be on-the-job, off-the-job or a combination of both.

4.3 Standard licence conditions

The Base Cabling Licence will be phased out by October 2005 the following standard conditions apply to holders of a BCL:

- The type of premises in which the licensee may perform cabling work;
- Cabling work performed under this licence shall comply with Technical Standard AS/ACIF S009:2001 (or it's replacement);
- Requiring that the licensee shall only install cable and cabling product that complies with Technical Standard AS/ACIF S008:2001 (or it's replacement) and customer equipment which complies with the Telecommunications Labelling (Customer Equipment and Customer Cabling) Notice 1997;
- Except as specified in Technical Standard AS/ACIF S009:2001, or unless otherwise authorised in writing by the carrier, the licensee shall not run jumpers on the Campus/Building Distributor extending the carrier's, or carriage service provider's network into the customer premises;
- At the completion of each cabling task, the licensee shall provide the client (ie the customer or employer, whichever is appropriate) a certification statement. This must be in the standard format attesting the cabling work performed by or supervised by the licensee fully complies with the requirements of the Telecommunications Act 1997 and Technical Standard AS/ACIF S009:2001. This statement shall be on a standard form or incorporated within the cable installer's invoice receipt. The licensee will maintain copies of such forms for at least 1 year and make them available to ACA inspectors or ACIF cabling auditors on request;
- Requiring that the licensee shall notify NECA of any change of address;
- Reserving the right for the licensee's work to be inspected by ACA inspectors, ACA cabling auditors and the carriers;

The ACA will advise the licensee of any variations in writing. Variations may result from:

- The industry or the regulator seeing a need for an additional condition in a licence;
- The licensee requesting a variation or additional condition on their licence. The written advice will include the text of the variation and the ACA's reason for the variation. The licensee will receive a statement to the effect they may within 21 days after receiving the notice apply to the ACA for reconsideration of the variation.

4.4 Self Help Questions

Write your responses to the following questions:

1. What authority is currently responsible for overseeing the telecommunications industry?

   .....

   .....

2. From which Act does the industry regulator derive their powers?

   .....

3. Name three (3) items listed in the ACA's role that directly relate to cablers.

   .....

   .....

   .....

4. What organisation manages Australia's contribution to international technical standards on communications?

   .....

   .....

Section 5 Cabling Provider Rules

5.1 Introduction

The previous section looked at the license conditions in place prior to 3rd October 2000, this section will examine the Telecommunications Cabling Provider Rules 2000, which came into effect on 3rd October 2000 replacing the Cabling Licence system with the new Registration System.

Purpose

To develop knowledge of the CPR's (Cabling Provider Rules), effective as from 3rd October 2000 and the obligations of registered cablers. This also looks at the transitional aspects for those with cabling licences prior to ACA's implementation of the Cabling Provider Rules.

Objective

At the end of this section successful participants will be able to:

- Describe the rules that the ACA makes under the Telecommunications Act 1997. These include:
  - Cabling Provider Rules (CPR's)
    - Definition of terms
    - Application of rules
    - Types of cabling work
    - Registration
    - Performance of cabling work
    - Relationship with ACA
    - Transitional arrangements
- Describe the licensing and supervision conditions of a licence or registration.

Resources

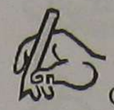
The following resources are required to complete this section:

- Standards Australia Communications Cabling Manual (CCM)
- NTE005 Learner Resource
- ACA information brochure on Cabling Provider Rules
- Telecommunications Cabling Provider Rules 2000 as made by the ACA under subsection 421(1) of the Telecommunications Act 1997. These rules are available from the ACA web site: http://www.aca.gov.au/legal/telecom/cprs2000.rtf. This document has been included in this workbook (Appendix A) as a reference to answer the self-help questions at the end of the section.

5.2 Summary of Cabling Provider Rules

Read Section 1, Module 1 (HB243: 2000) of the CCM.

This section summarises The Cabling Provider Rules in 10 points.

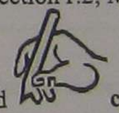


Complete the following:

1. Cabling work must comply with the .....
2. To register cablers must meet the ACA's ..... for one of the ..... mandated types of cabling work.
3. Unregistered or ..... cablers undertaking cabling work must be directly ..... by a registered or licensed cabler.

5.3 Conversion to CPR's

Cabler's who hold a current Cabling Licence are automatically eligible for the corresponding registration type as shown in Chart 1, Section 1.2, Module 1 of CCM.

-  **Read** this section and  **complete** the table below.

Licence Type	CPR Registration
Base Cabling Licence (BCL) General Premises Cabling Licence (GPC)	
Restricted Cabling Licence (RCL)	
Lift Premises Cabling Licence (LPC)	
Endorsements: (Aerial, Underground, Cat 5, Fibre Optic, Co-axial,)	

5.4 Types of Cabling Work

5.4.1 Restricted Cabling Work

Those persons who obtain Restricted Rule Registration or already possess a RCL will be able to perform the following work:

- Terminating on a socket or NTD
- Aerial or underground work on private property
- Aerial cabling work must not use electricity poles

5.4.2 Open Cabling Work

Those persons who obtain Open Rule Registration or already possess a BCL or GPC License will be able to perform any work covered under a Restricted Rule Registration as well as the following work:

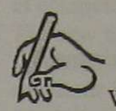
- All cabling work
- Terminating directly on a socket or NTD or distributor
- Can supervise an unregistered or restricted registered person

Many of the Cabling Licence rules from the previous section are still pertinent to the new Cabling Provider Rules, which can be referred back to this unit. This will be evident as the learner reads through the following legal document, which is also available on the ACA web site.

5.5 Registrars

The ACA accredits industry bodies to act as registrars for the cabling industry. Under CPR's a cabler must register with one of these registrars to undertake cabling work.

Read Section 1.5, Module 1 (HB243: 2000) of the CCM.



Write responses to the following

1. How many levels of registration do the registrars offer and what are they?

.....

.....

.....

2. How many Registrars are you required to register with?

.....

3. How many Registrars are there? (Current information is available on the ACA web site)

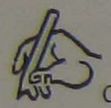
.....

5.6 Supervision of Unlicensed Cablers

An unlicensed person cannot perform any cabling work (that requires a licence) unless under the personal supervision of an ACA/AUSTEL licensed cabler.

Supervision of unlicensed cablers requires the licensed cabler to provide personal on-site supervision of all unlicensed cablers during the complete installation phase of all customers cabling.

Read Section 1.9 of Module 1 (HB243: 2000) in the CCM, this outlines the requirements for supervision of unlicensed workers.



Complete the following:

1. Outline the consequence of an ACA Inspector finding unlicensed cablers working on-site.

.....

.....

.....

2. What is the possible fine for cabling without a license?

.....

5.7 Competency standards

The ACA requires the cabling licence applicant to have sufficient skills, knowledge and experience before they will issue a licence. In the past the previous regulator, AUSTEL, conducted licensing examinations based on the content of the Customer Premises Cabling Manual. A cabling licence was issued to applicants scoring eighty per cent or more and having the relevant cabling experience. This regime did **not** provide a measure of the cabling licence applicant's experience and skill level.

The Telecommunications Industry Training Advisory Board (TITAB) coordinated the development of competency standards, off-the-job training curriculum and on-the-job assessment requirements. The new training system requires trainees to satisfy industry specified outcomes. Competency standards and training curriculum clearly define these outcomes. National curriculum for these standards includes the training necessary to provide the specific skills within the standards. Workplace assessors will assess trainees against these standards in the workplace. It is possible to undertake assessment for some specialised areas in suitable simulated work environments.

Competency consists of the specific knowledge, skill and application within an occupation or industry, to the standard of performance required in employment.

Competency standards define those competencies necessary for effective performance in employment. This includes the specification of skills and knowledge. Competency standards focus on what the workplace expects of an employee rather than on the learning process.

5.7.1 Assessment of competency standards

Workplace assessors will assess the on-the-job standards. These assessors are normally supervisors, skilled trainers or competent cable installers who have undertaken special training in the field of assessment. Small employers may use external assessors to perform the assessment task.
TAFE colleges and other approved training providers will normally undertake assessment of underpinning knowledge. The assessment for this will normally take place off the job.

5.8 Inspection of Work

5.8.1 Telecommunications cabling advice

All ACA/AUSTEL licensed cablers must complete a *'Telecommunications Cabling Advice'* form. A copy of this form remains with the customer and a copy retained by the cable installer. This advice must be on a standard form (See the ACA's sample TCA1 form in Module 1 Section 8 of the CCM) or incorporated into the cable installer's invoice statement. *A copy of the TCA1 form in PDF format is available from the ACA's web site.*

This requirement is a condition of all cabling licences. It is the responsibility of the cabler to maintain all necessary installation records. It is **not** the responsibility of the employer to maintain the 'cabling advice' forms. If ACIF auditors or ACA inspectors request to view the 'cabling advice' forms, they will make the request in writing, by a direct telephone call to the cable installer or by personal request.

Read Module 1 Section 1.6 of the CCM for further information.

5.8.1.1 Maintenance of cabling advice

The licensed cabler must maintain these 'cabling advices' in a clear and legible fashion.

The 'cabling advice' is to include minor work such as the installation of parallel sockets in a domestic installation. The ACA does **not** require completion of a 'cabling advice' for the following:

- Running, transposing or removing jumpers from distribution frames
- Marking, replacing and upgrading cabling records
- All testing and transmission measurement activities.
- Replacement of sockets or other minor cabling equipment for maintenance purposes.

The following pages have examples of TCA1 forms for typical installations for residential & commercial premises.

5.8.2 Inspection of cabling work by a carrier

The carriers are responsible for their networks. They also have the right to inspect cabling work. They may inspect work to ensure it satisfies current AS/ACIF technical standards in relation to network integrity, personal safety and proper network functioning. The carriers' right to inspect is a condition of the cabling licence. If a carrier inspection reveals a threat to safety or integrity of their network then they may disconnect or refuse to connect some or all services.

Read Section 5.1.3 of AS/ACIF S009:2001.

Complete the following:

A carrier may.....customer equipment that is, or is likely to be, a.....

to the health and safety of any persons or the.....a telecommunications network or facility.

Shown below is a sample *'Telecommunications Cabling Advice'* for a typical domestic residence.

Note the information required in the record.

Telecommunications Cabling Advice (TCA1)

Copies: 1. Customer 2. Cabling Provider 3. Employer (If applicable)

Registered/Licensed Cabling Provider			
Name		**Contact Details**	
Surname	Installer	**Business Phone**	(07) 3456 7890
Given Names	Ima	**Mobile**	0412 345 678
Business Address		**Registration or License Number**	
24 Broadway St,		000123456	
Inatown		**Name of Registrar**	
QLD	**Postcode** 4567	TITAB Australia Cabler Registry Services	
Employer if Applicable			
Name of Company		**Contact Details**	
N/A		**Phone** ( ) N/A	
Address			
N/A		**Fax** ( ) N/A	
Postcode			
Description of Work (Including any Supervision)			
Installed additional socket to main bedroom and a tone ringer to the rear verandah. Both cabled through the ceiling from 1st socket/network boundary in lounge room.			

Customer Details		**Certification**	
Name		I hereby certify that the cabling work described in this advice complies with the Wiring Rules (AS/ACIF S009: 2001) or its replacement	
Will Paye			
Address			
12 Cabled Way			
Newtown QLD	**Postcode** 4321	**Signature**	**Date** 03 / 04 / 01
Contact details		I Installer	
Phone (07) 3987 6543			
Fax ( ) N/A		**Print Name**	
Signature	**Date** 03 / 04 / 01		
Will Paye		I. Installer	

Shown below is a sample *'Telecommunications Cabling Advice'* for a typical commercial premises. Note the information required in the record.

Telecommunications Cabling Advice (TCA1)

Copies: 1. Customer 2. Cabling Provider 3. Employer (If applicable)

Registered/Licensed Cabling Provider	
Name	**Contact Details**
Surname Installer	**Business Phone** (07) 3456 7890
Given Names Ima	**Mobile** 0412 345 678
Business Address	**Registration or License Number**
24 Broadway St,	000123456
Inatown	**Name of Registrar**
QLD **Postcode** 4567	TITAB Australia Cabler Registry Services
Employer if Applicable	
Name of Company	**Contact Details**
Australia Wide Installations Pty Ltd	**Phone** (07) 1300 246 864
Address	
24 Broadway St,	**Fax** (07) 1800 246 468
Inatown QLD **Postcode** 4567	
Description of Work (Including any Supervision)	
Installation of additional distributor (N0. 1D) to new production office.	
(50 pr cable from Network Boundary distributor via shared cable tray to 250 pair distributor in shared services room)	
Installation in above office, of 40 x 8way modular telecommunications outlets with 20 extensions fed	
from office PABX.	
All outlets wired in 4pr, Cat 5 cable via skirting duct and facility poles.	
Cabling is not certified to Cat 5.	

Customer Details	**Certification**	
Name	I hereby certify that the cabling work described in this advice complies with the Wiring Rules (AS/ACIF S009: 2001) or its replacement.	
Great Productions		
Address		
12 Equipment RD		
Worktown QLD **Postcode** 4444	**Signature**	**Date** 01 / 04 / 01
Contact details	Ima Worker	
Phone (07) 3222 1111		
Fax (07) 3111 2222	**Print Name**	
Signature **Date** 01 / 04 / 01		
Ina Debtou	I. Worker	

Activity

Complete the necessary entries in the Telecommunications Cabling Advice form, (on the following page), for the following installation. Assume that you are the Registered Cabling Provider. Include additional information as required in order to complete the installation record.

You were responsible for the following:

- The installation of a new 11 way distributor (No. 3B) in the main administration building of a manufacturing company.
- A 50 pair cable has been run to the new distributor on the third floor and extends from the Network Boundary(NB) distributor.
- The NB distributor is located on the ground floor.
- PABX extensions are to be connected to 20 new telephone outlets, which have been cabled from the new distributor (No. 3B).
- An additional vertical was required on the NB distributor to accommodate the new cable.
- The outlets terminate on Cat 5 outlets and cabling used was 4pr Cat 5 cable.
- The installation was not certified as a Cat 5 installation.

Telecommunications Cabling Advice (TCA1)

Copies: 1. Customer 2. Cabling Provider 3. Employer (If applicable)

Registered/Licensed Cabling Provider	
Name	**Contact Details**
Surname	**Business Phone** ( )
Given Names	**Mobile**
Business Address	**Registration or License Number**
	Name of Registrar
Postcode	

Employer if Applicable	
Name of Company	**Contact Details**
Address	**Phone** ( )
Postcode	**Fax** ( )

Description of Work

Customer Details		**Certification**	
Name		I hereby certify that the cabling work described in this advice complies with the Wiring Rules (AS/ACIF S009: 2001) or its replacement.	
Address			
Postcode		**Signature**	**Date**
Contact details			
Phone ( )			
Fax ( )		**Print Name**	
Signature	**Date**		

5.9 Line links between premises

The *Telecommunications Act 1997*(the Act) does not place any restrictions as to who can install and own infrastructure, including line links (ie. twisted pair, coaxial or optical fibre cable). Under the Act, which came into effect on 1 July 1997, it is no longer necessary to obtain an authorisation from the Australian Communications Authority (ACA) for installation of line links where the boundaries of the premises are less than 500 metres apart (previously known as the '500 metre rule').

If a link is to be installed between premises, that are at least 500 metres apart it will be a network unit and subject to the carrier licensing regime if it is to be used to supply services to the public.

A licensed cabler can install these line links, and can install network units if they are for the "own use" of his client. Network units have other requirements that should be also understood. AS/ACIF S009:2001 is applicable to the installation as is local government jurisdiction, and use of existing infrastructure (poles, pits etc) are not allowed unless agreements (if available) are in place.

A Line Link between premises may only be installed by a cabler with an **open** license/registration. A cabler with a restricted license or registration may only cable within the customer premises boundary.

Read Module 1 Section 4 – "Line links between premises" of the CCM

Complete the following:

1. A distinct place is a..... for which a separate ..... or ..... exists.

2. Explain what approvals may be required when installing line links.

   .....

   .....

   .....

3. The maximum distance between distinct places for a single line link is ..... m.

4. The maximum aggregate distance for two or more point-to-point line links is ..... m.

5.10 Self Help Questions

Write your responses to the following questions.

1 Licensed cablers can install cable beyond a specified boundary. What is this boundary?

.....

2 Which class of licence allows the licensee to perform work only in premises having exchange lines terminating on compliant sockets only?

.....

3 Is there a fee applicable for any cabling registration?

.....

4 If an unregistered installer is working on a site without supervision, who is liable to be fined?

a. The unregistered installer

b. The registered/licensed cabler who is supposed to be supervising the installer.

c. The customer who has engaged the installer

d. No one would be liable for a fine

5 What happens if a licensed cabler fails to register with one of the Registrars before the expiry date of their BCL/GPC license?

.....

.....

.....

6 Unlicensed persons can perform cabling work under the supervision of an ACA/AUSTEL licensed cabler. What does supervision mean in this context?

.....

Q11 Before being issued with a licence, an applicant must possess sufficient .....

.....and .....:

Q12 What is the focus of competency standards?

.....

Q13 In relation to the Telecommunications Act, the first socket is:

(a) The first socket that a customer's prefers to use

(b) The first socket within a customer's premises from which customer cabling can be supplied and installed by a licensed carrier

(c) The socket in a customer's premises where carrier inspection rights cease

(d) The socket within a customer's premises that terminates a carrier's network where there is not a distributor.

Q14 What is the approximate maximum penalty for performing telecommunications cabling without the appropriate licence/registration?

(a) Nil

(b) $100

(c) $2,000

(d) $13,200

Q15 What is the possible consequence of a licensed/registered cabler failing to install to the minimum requirement specified in AS/ACIF S009:2001?

(a) AUSTEL may change the conditions of the licence/registration.

(b) Cancellation of the licence/registration.

(c) The carrier shall disconnect the cabling or equipment from the line.

(d) None as AS/ACIF S009:2001 is only a guide.

Q16 If a licensed/registered cabler changes employment, a cabling licence/registration stays with:

(a) The original employer of the cabler.

(b) The person to whom it is issued.

(c) Nobody, as the licence/registration becomes void.

(d) It depends on who paid the licensing fee.

Q17 What level of registration must a cabler have to install a Line Link between premises?

(a) Open

(b) Open with endorsement for aerial & underground cabling

(c) Restricted

(d) Restricted with endorsements for aerial and underground cabling

Q18 Who is responsible for the installation and maintenance of customer cabling, where there are several customer cables on a campus, and the customer cabling is comprised of both aerial and underground cabling?

(a) A licensed electrician.

(b) The carrier.

(c) The customer.

(d) The customer's licensed/registered cabler.

Q19 Where outdoor cable outside the boundaries of a customer's premises extends across a public road, private property and a council reserve, then what are the requirements for this cable?

(a) It can use pits, pipes, ducts or poles supplied by the carrier without their agreement.

(b) It requires written authorisation from the carrier.

(c) It can be provided, installed and maintained by a licensed cabler without the need for an ACA authorisation, provided the distance from property boundary to property boundary is less than 500 metres.

(d) It must be provided, installed and maintained by the carrier if the distance from property boundary to property boundary is at least 500 metres and is for own use.

Section 6 Cables and Cabling Products

6.1 Introduction

Cabling products include all equipment designed to form part of a customer cabling installation. This includes cable, cable interconnection devices, terminal blocks and telecommunications outlets of all kinds and designs.

Technical Standard AS/ACIF S008:2001 details the requirements for cables and cabling products.

All equipment connected to and used in a customer cabling installation must be of a recognised telecommunications type and must **not** be of a type for mains power (refer AS/ACIF S008:2001 *Clause 5.1.1*).

Purpose

To develop knowledge of the regulatory requirements that apply to cables and cabling products intended for connection beyond the network boundary.

Objectives

At the end of this section successful participants will be able to:

- Describe the requirements for insulation and sheath material of customer cables for indoor and outdoor use.
- Use the Certified Components List to identify compliant cable and cabling products.
- Detail the nature of compliance markings for cabling products.
- Summarise the regulatory requirements for common indoor and outdoor customer equipment.
- Understand the requirements for wiring kits.
- Outline the characteristics of jumper wires.
- Be aware of the minimum requirements of conduit/pipe used for outdoor use.

Resources

The following resources are required to complete this section:

- Standards Australia Communications Cabling Manual
- NTE005 Learner Resource.

Access to various items of cabling products would be advantageous.

6.2 Cabling Product Markings

Read Module 1 Section 6 of the CCM - Labelling of cable, cabling product & customer equipment.

If you have access to the internet the current Labelling Notice "Telecommunications Labelling (Customer Equipment and Cabling) Notice 1997" may be downloaded from the ACA website at http://www.aca.gov.au/legal/notice/TLN2001.pdf, relevant parts of this document have been included in this workbook. To view the entire labelling notice it can be downloaded from the web site.

The following is an extract from the "Telecommunications Labelling (Customer Equipment and Cabling) Notice 1997":

3.6 Placement of labels on items

(1) A label must be applied to a surface of an item that is readily accessible to the user of the item unless subsection (2) or (3) applies.
Example
An external surface that is revealed by removing the battery of a mobile phone.

(2) For customer equipment, if it is not practicable to apply the label to the surface of the equipment because of the size or physical nature of the equipment, the label must be applied:
(a) To the external surface of the packaging used for the equipment; and
(b) To the documentation that accompanies the equipment when it is supplied to a user.

(3) For customer cabling, if it is not practicable to apply the label to a surface of the cabling because of the size or physical nature of the cabling, the label must be applied to the external surface of the packaging used for the cabling.

(4) If a label must be applied to the external surface of the packaging used for an item, the label must:
(a) Occupy an area that is greater than 1% of that external surface; and
(b) Be clearly visible.

(5) If a product identification code is displayed on an external surface of an item, a label must be applied as close as practicable to the product identification code.

(6) If any of the information mentioned in paragraph 3.1 (2) (b) about the supplier of an item is displayed on an external surface of the item, the label must be applied to the item in a way that does not obscure that information.

3.7 Marking customer cabling

A supplier of customer cabling must ensure that there is displayed on the sheath of the cabling at regular intervals of not more than 2 metres:
(a) a company name, trade name or trade mark; and
(b) a part number, identification number, product name or part name.

Read Module 1 Section 6 of the CCM – "Labelling of cable, cabling product and customer equipment." and the above extract from the labelling notice.

Complete the following statements.

1. Cables compliant to AS/ACIF S008:2001 must have the manufacturers or importers

   ..... (or registered trade name or mark) and the manufacturers or importers

   .....(or similar) displayed on the sheath at intervals **not** exceeding

   .....metres.

2. All new cabling products on the market (since cessation of the CCL and the permit scheme) must also display the relevant compliance or non-compliance marks. Draw these here

   ....

However, products too small physically to support labelling of 3 mm point size are exempted from this requirement and may be applied to the packaging.

Equipment supplied and installed under previous regulatory regimes, used a permit number to indicate compliance with technical standards at that time. Equipment that had a permit number may continue to be sold with the permit label instead of the 'A-tick'.

Refer to Section 6.5 of Module 1 of the CCM for an explanation of Permit Numbers.

6.3 Certified Components List

AUSTEL previously maintained a voluntary listing of compliant components (not equipment) for use on telecommunications services. These items appeared in AUSTEL's Certified Components List (CCL) in previous editions of the CCM. The CCL is no longer included as a part of the Communications Cabling Manual.

Note: The CCL was not maintained after June 30 1997. All new, unlisted cabling components must bear a positive compliance mark ('A-tick') when presented for sale after 30 Jun 1998. Components that were included on the CCL may continue to be sold and claim compliance to AS/ACIF S008:2001 because of their listing on the CCL.

The CCL is now only available at the following website:

http://www.aca.gov.au/standards/cabling/product.htm

6.4 Customer cables

6.4.1 General

Cables used for telecommunications cabling **shall** be physically distinguishable from products used for mains power (refer AS/ACIF S008:2001 5.1.1 & 5.7.2.1)

All cabling products shall be marked in English in accordance with the appropriate requirements specified in the *Labelling Notice*. (Refer AS/ACIF S008:2001 5.2.1.1)

On cables other than optic fibre, coaxial cable, or cables of twisted twin, triple or quad construction, the words "communications cable" shall be displayed on the sheath at regular intervals that shall not exceed two (2) metres (refer Telecommunications Labelling Notice 1997 Section 3.7).

The material used for the conductor must be copper or other suitable material and may be plain or tinned. The recommended diameter for the conductor is in the range of 0.4 mm to 0.9 mm. (Refer AS/ACIF S008:2001 5.8.1)

- External cables are normally 0.4, 0.64 or 0.9mm.
- Internal cables are typically 0.5mm

6.4.2 Basic construction

Two insulated copper conductors make the basis of the telephone service to the customer's premises. Twisting these insulated wires together forms a *'twisted pair'*.

This twisted pair forms the pathway for signals between the customer's telephone and the carrier's exchange or for voice and data transmission within the customer's premises.

6.4.3 Pairs and quads

Twisting the insulated wires into groups of two, forms "pairs", or twisting into groups of four, forms "quads" (Quad Cable). The length of twist varies so that no two adjacent "pairs" or "quads" have the same rate of twist per metre. This reduces induction or *'cross talk'* between "pairs".

6.4.4 Common cables

Telecommunications services use various styles of twisted pair cables. The unsheathed twisted pair cable is a jumper or cross-connect wire. Apart from jumper wire, cables suitable for telecommunications use fall into two main categories. These categories are:

- Indoor and
- Outdoor.

Both indoor and outdoor cables incorporate a sheath over the basic twisted pair construction. A cable may consist of one pair or hundreds of pairs. A colour code distinguishes the individual pairs. In cables having larger pair counts, and in outdoor cables, a colour coded binding tape is used to identify individual groups.

Activity

Obtain a cable manufacturers brochure for telecommunications cable from one of the cable manufacturers websites or a local supplier and find out the typical conductor diameter for internal cables & external cables supplied by that manufacturer.

Contact your course facilitator for a list of websites or suppliers.

6.5 Requirements for customer cables

6.5.1 General requirements

Clause 5.7.2. of AS/ACIF S008:2001 specifies the general requirements for all types of cables used for telecommunications purposes including internal and external cables.

Read Clause 5.7.2 of AS/ACIF S008:2001.

Complete the following statements.

1. Cables solely intended for telecommunications purposes shall not be of a design or type commonly used for .....
2. .....cable..... also comply with the requirements for water .....
3. The .....and sheath materials used shall be suitable for telecommunications use.
4. A system of wire or optical fibre .....shall be used in all multi-wire or multi-fibre customer cabling.

6.6 Requirements of metallic customer cables

6.6.1 Conductors

Read Clause 5.8.1 of AS/ACIF S008:2001.

Complete the following statements.

1. Metal conductors shall be either .....or ..... and may be either ..... or.....
2. Conductor finish should be ..... or.....
3. Where a shield is provided is shall be ..... continuous.

6.6.2 Electrical characteristics of metallic customer cables

Clause 5.8.2 of AS/ACIF S008:2001 details the requirements of the different electrical characteristics of metallic telecommunications cables. These include:

- Withstand voltage
- Mutual Capacitance
- Capacitance unbalance
- Insulation resistance
- Additional electrical requirements of coaxial cables

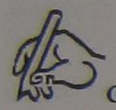
Look at tables 4 and 5 of AS/ACIF S008:2001.

Complete the following statements.

1. Cable withstand voltages (kV a.c.) for conductor to core for indoor cable is ..... and for outdoor cable is .....
2. Minimum insulation resistance (M?km) for indoor cable is .....and for outdoor cable is .....

6.6.3 Metallic cordage

Read Clause5.8.4 and of AS/ACIF S008:2001.

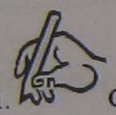


Complete the following statements:

1. Conductors in cordage should be either ..... or .....conductor construction.
2. Cords shall be ..... in any plug or socket .....to a cord by an appropriate anchorage or strain relief.

6.7 Requirements of optical fibre cables and cords

Read Clause5.9 of AS/ACIF S008:2001.



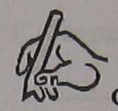
Complete the following statements.

1. The supplier ..... make available to the ....., on request a Type Test Report , specifying the mechanical and the environmental performance of a particular cable.
2. Cords shall be .....in any plug or socket connected to a cord by an appropriate..... or .....

6.8 Jumper wires

Read Clause 5.8.3 of AS/ACIF S008:2001.

The requirements for jumper wire are derived from the requirements for indoor cable and relate to conductor material, electric withstand voltage, form of wire identification, insulation resistance, type of insulation and specification for a shield if applicable.



Complete the following statement:

The clause specifies that jumper wire shall have a minimum of ..... twists per metre, which is greater than the basic indoor cable twist rate.

It is a requirement to employ a system of wire identification so that the wires are readily identifiable from one another. It is common practice, in Australia, to use a colour code similar to the following:

Single pair jumper wire:
- Red and White
- Green and White
- Blue and White

Triple jumper wire:
- White, Red and Blue

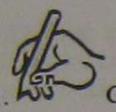
Quad jumper wire:
- White, Red, Blue and Black

Quintuple jumper wire:
- White, Red, Blue, Yellow, and Black

Six wire jumper wire:
- White, Red, Blue, Yellow, Black and Violet

6.9 Cabling components for use on underground and aerial installations

6.9.1 Pits

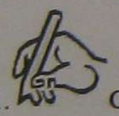

Read Clause 5.12.1 of AS/ACIF S008:2001.

Complete the following statements.

1. Mechanical integrity of pits shall not be adversely affected by .....
   exposure to ..... and .....

2. Entry holes must be capable of being ..... to prevent .....

3. The pit cover shall be ..... and .....
   labelled with the word ..... or ..... to
   distinguish it from pits for other services.

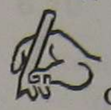
6.9.2 Underground joint/termination enclosures


Read Clause 5.12.2 of AS/ACIF S008:2001.

Complete the following statement:

1. Underground enclosures shall provide protection of the joint or termination to at least .....,
   with test conditions to ..... normal conditions.

2. Terminations may form part of the ..... or be separate. In
   either case they shall have a minimum protection to ..... when installed in the
   enclosure.

6.9.3 Pillars and cabinets


Read Clause 5.12.4 of AS/ACIF S008:2001.

Complete the following statements.

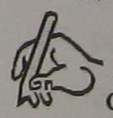
1. The material used for the construction of the pillar **shall not** deteriorate with exposure to
   ..... and .....

2. Pillars and cabinets must offer a minimum protection of .....

3. Pillars and cabinets must have provision for .....

4. Pillars and cabinets should be ..... and ..... labelled to
   distinguish them from those used for other services.

6.9.4 Aerial joint/termination enclosures


Read Clause 5.12.5 of AS/ACIF S008:2001.

Complete the following statements.

1. Enclosures must offer a minimum protection of .....

2. Aerial enclosure covers must be ..... to allow access to terminations.

3. Enclosures shall provide ..... from
   ..... to 240V rms grade in accordance with
   AS/NZS 60950:2000.

4. The mechanical integrity of the construction of the enclosure **shall not** deteriorate with exposure
   to ..... and .....

6.9.5 Conduit/Pipe

AS/ACIF S009:2001 requires that where conduit/pipe is used for outdoor communications cabling, it must comply with the requirements detailed in AS/ACIF S008:2001.

Read Section 5.3.1 and 5.3.2 of AS/ACIF S008:2001.

Complete the following statements.

1. Non-metallic conduit/pipe for .....use shall be coloured ..... or

   contain a .....

2. The grade of conduit shall have a minimum mechanical stress classification of .....

   .....

Indoor conduit may be of any colour other than those specified for hazardous services.

6.10 Self Help Questions

1. Cabling products other than cable, must display:
   (a) The AUSTEL specifications under which the product was manufactured
   (b) The manufacturer's name and date of manufacture
   (c) One of a number of markings to identify the manufacturer or importer, and a compliance mark
   (d) Any overseas regulatory compliance mark

2. What colour identifies non-metallic conduit/pipe as that of telecommunications, when used outdoors?
   (a) White as a full colour or a stripe.
   (b) Orange
   (c) Yellow
   (d) Grey as a full colour or a stripe.

3. What would indicate that Customer Equipment or Customer Cabling was compliant with the relevant ACA Technical Standards?
   (a) A or AUSTEL permit number
   (b) A mark
   (c) A mark
   (d) A mark

4. What material is suitable for the insulation of underground customer cables?
   (a) PVC
   (b) Any material that is suitable for telecommunications use
   (c) PVC, Polypropylene or other suitable material meeting the requirements of AS 1049
   (d) Polyethylene or other suitable material meeting the requirements of AS 1049

5. The conductors of metallic customer cables:
   (a) May be solid conductors.
   (b) Must be of stranded or tinsel conductor construction.
   (c) Can be of any suitable material.
   (d) May be of stranded or tinsel conductor construction with a maximum 5 m length.

6. Underground jointing enclosures require a minimum rating to AS 1939 of:
   (a) IPX4
   (b) IPX6
   (c) IPX7
   (d) IPX8
7. The typical size of copper conductors for indoor cable is
   (a) 0.4 mm
   (b) 0.5 mm
   (c) 0.64 mm
   (d) 0.9 mm
8. The number of twist per metre for jumper wires is:
   (a) Maximum of 13/metre
   (b) Maximum of 9/metre
   (c) Minimum of 10/metre
   (d) Minimum of 13/metre
9. The conductors in metallic cordage:
   (a) May be solid conductors
   (b) Should be stranded or tinsel construction
   (c) Can be of any suitable material
   (d) Shall be stranded conductors only

Section 7 Installation at the Network Boundary

7.1 Introduction

Purpose

To develop knowledge of the regulatory requirements that specify the network boundary of a carrier or carriage service provider's network, where a licensed cabler can access such a network, and the details of installing distributors located at a network boundary.

Objectives

At the end of this section successful participants will be able to:

- Describe the physical properties of Network Boundary (NB) Distributors
- List the points where a licensed/registered cabler can access a carrier's network
- Define the cabling components that are recognisable as a network boundary.
- State what the requirements are for provision and maintenance of records at a NB Distributor.
- Detail the conditions relating to the installation of a NB Distributor.
- State the minimum permissible clearances that apply to the installation of a NB Distributor.
- Describe prohibited locations for installation of the NB Distributor.

Resources

The following resources are required to complete this section:

- Standards Australia Communications Cabling Manual
- NTE005 Learner Resource
- Access to a NB Distributor would be advantageous.

7.2 Important terminology

A glossary of definitions used in customer cabling, is contained in Section 4 of Technical Standard AS/ACIF S008:2001 and Section 4 of Technical Standard AS/ACIF S009:2001
Use one of the above references as a guide to complete the following exercises. These exercises require you to find the definitions of important technical terms.

1. Summarise the definition of a Lead-in Cabling

.....

.....

.....

2. Summarise the definition of the Property Entry Point

.....

.....

.....

3. Summarise the definition of a Network Boundary Distributor

.....

.....

.....

4. Summarise the definition of a Network Termination Device

.....

.....

.....

7.3 General

To ascertain what the physical point of the network boundary of a carrier or carriage service provider's network is, and thus the point on telecommunications cabling from which licensed/registered cablers work, we need to look at the *Telecommunications Act* 1997.

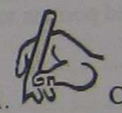
Read Clause 4.2.44 (including notes), of AS/ACIF S009:2001.

Complete the following summary.

The Network Boundary of a carrier or carriage service provider's network where it can be accessed by licensed cablers is either a .....if there is one on a line, or a .. .., or the ..... socket on the line.

It should be noted that a carrier and a customer may agree to a Network Boundary point at another location, possibly closer to the property entry point.

Read Clause 5.3.1 of AS/ACIF S009:2001.



Complete the following:

A carriers lead-in cabling or network boundary facilities **shall not** be .....,

..... or .....without the .....

..... authorisation of the carrier.

7.4 Network Boundary Enclosures

7.4.1 Distributors

A distributor where used to terminate lead-in cables and customer cables as a network boundary for a service provided by a carrier or carriage service provider is known as the Network Boundary Distributor (NBD). AS/ACIF S008:2001 Clause 5.4.2 details requirements for NBD's.

These distributors are typically used where a 10 pair or greater sized lead-in is installed and multiple modular type terminations are used.

Read AS/ACIF S009: 2001 Clause 5.3.2 & AS/ACIF S008:2001 Clause 5.4.2

Complete the following sentences:

1. A minimum of ..... mm clearance **shall** be provided between the carriers side termination modules and the inside face of the front cover or .....of the distributor, in the fully closed position to allow for the fitting of .....
.....

2. The distributor should be suitable for mounting the .....standard ..... system on the carrier's side of the distributor.

The standard termination system used by Telstra & Optus is the Krone LSA plus system. The termination system for other carriers should be checked with those carriers.

3. The distributor, or enclosure in which it is located, shall have provision for ..... with a .....,.....or .....

7.4.2 Network Termination Device Enclosure (NTDE)

An NTDE where installed is used to establish a telecommunications network boundary near the building entry point of a typical residential or small business premises. Typically the lead in cable for these installations are 10 pair or less.

AS/ACIF S008:2001 Clause 5.5 details requirements for an NTDE.

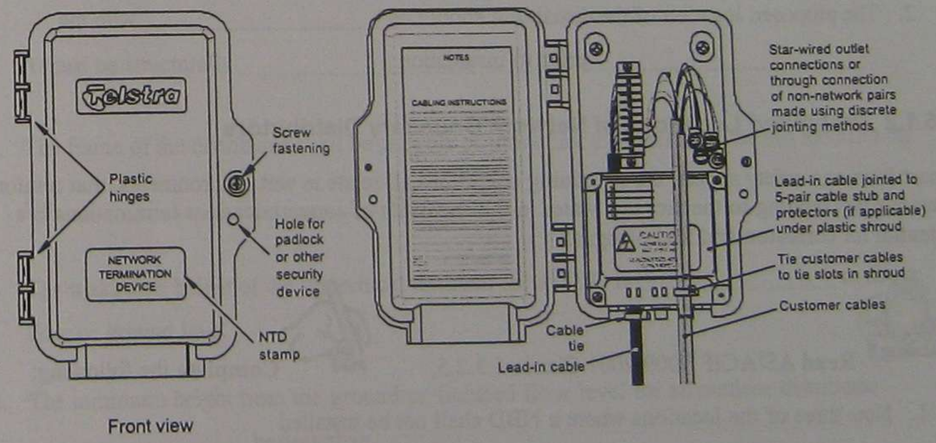
Read Clause 5.5 of AS/ACIF S008:2001 and Clause 5.3.4 of AS/ACIF S009:2001

Complete the following statements.

1. All enclosures manufactured for outdoor installation shall provide a ..... degree of protection of .....

2. The NTDE shall carry .....and ..... external markings describing the enclosure as .....or .....

3. The NTDE shall not be installed on .....property.



Front view

Figure 1 - Network Termination Device Enclosure
(Courtesy of Telstra Corporation Ltd)

7.5 Connections to a Carrier's Network

7.5.1 Premises with a Network Boundary Distributor (NBD)

In the current standard a **NBD** is a distributor at which the carrier's lead-in cable terminates.

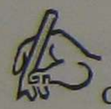
Terminology previously used for a Network Boundary Distributor include:

- **MDF** Main Distribution Frame
- **CD** Campus Distributor
- **BD** Building Distributor

The network boundary distributor is referred to as an MDF in the *Telecommunications Act 1997*.

7.5.1.1 Locations of Network Boundary Distributors

Read Clauses 5.3.2 .1 to 5.3.2.4 of AS/ACIF S009:2001.



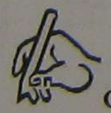
Complete the following:

1. The installed position must be free from the ingress of .....and .....and **not** subject to damp and/or humid conditions.
2. The proposed location of the distributor should be ..... with the .....prior to installation.

7.5.1.2 Prohibited Locations of Network Boundary Distributors

Apart from one safety aspect, the remaining conditions all relate to wet environments, that reinforce previous text relating to the fact that water in the enclosure of communications terminations is a potential for corrosion and loss of signal.

Read AS/ACIF S009:2001 Clause 5.3.2.5,



Complete the following:

1. Note three of the locations where a NBD shall not be installed
   a. .....
   b. .....
   c. .....

7.5.1.3 Accessibility

Clearances are required for licensed cablers and carrier staff to work safely at a network boundary distributor.

Read Clause 5.3.2.6 of AS/ACIF S009:2001

Egress without tools or keys etc allows immediate exit from a room when required. eg. Gas entering via the lead-in pipe.

7.5.1.4 Additional Requirements

In addition to the requirements for locations of a NBD, a number of other conditions are required to be met including lighting, minimum clearances, and markings.

Read Clause 5.3.2.8 of AS/ACIF S009:2001

Complete the following statements:

1. The area must have adequate .....
2. It must be structurally .....
3. The frame of the distributor shall be capable of mounting the carrier's standard modules on the .....side.
4. The maximum height of the uppermost terminal for a NBD is .....m above floor or ground level.
5. The minimum height from the ground or finished floor level for an outdoor distributor ..... be less than.....

For a diagrammatic form of the heights and measurements for locations of a NBD refer to AS/ACIF S009:2001 Appendix A or Module 2 HB29-2000 pages 10, 11 & 12.

7.5.1.5 Identification and marking

Alphabetical identification is used for the labelling of the verticals omitting the letters 'I' an 'O'

Numbering of the range of connecting terminals is in ascending order from the lowest module.

Read AS/ACIF S009:2001 Clause 5.3.2.8(h)

"I" - Omitted

A	B	C	D	E	F	G	H	J	K
241 - 250	241 - 250	241 - 250	241 - 250	241 - 250	241 - 250	241 - 250	241 - 250	241 - 250	241 - 250
231 - 240	231 - 240	231 - 240	231 - 240	231 - 240	231 - 240	231 - 240	231 - 240	231 - 240	231 - 240
221 - 230	221 - 230	221 - 230	221 - 230	221 - 230	221 - 230	221 - 230	221 - 230	221 - 230	221 - 230
211 - 220	211 - 220	211 - 220	211 - 220	211 - 220	211 - 220	211 - 220	211 - 220	211 - 220	211 - 220
201 - 210	201 - 210	201 - 210	201 - 210	201 - 210	201 - 210	201 - 210	201 - 210	201 - 210	201 - 210
		Space is left after each 100pr for attaching labels							
191 - 200	191 - 200	191 - 200	191 - 200	191 - 200	191 - 200	191 - 200	191 - 200	191 - 200	191 - 200
181 - 190	181 - 190	181 - 190	181 - 190	181 - 190	181 - 190	181 - 190	181 - 190	181 - 190	181 - 190
171 - 180	171 - 180	171 - 180	171 - 180	171 - 180	171 - 180	171 - 180	171 - 180	171 - 180	171 - 180
161 - 170	161 - 170	161 - 170	161 - 170	161 - 170	161 - 170	161 - 170	161 - 170	161 - 170	161 - 170
151 - 160	151 - 160	151 - 160	151 - 160	151 - 160	151 - 160	151 - 160	151 - 160	151 - 160	151 - 160
141 - 150	141 - 150	141 - 150	141 - 150	141 - 150	141 - 150	141 - 150	141 - 150	141 - 150	141 - 150
131 - 140	131 - 140	131 - 140	131 - 140	131 - 140	131 - 140	131 - 140	131 - 140	131 - 140	131 - 140
121 - 130	121 - 130	121 - 130	121 - 130	121 - 130	121 - 130	121 - 130	121 - 130	121 - 130	121 - 130
111 - 120	111 - 120	111 - 120	111 - 120	111 - 120	111 - 120	111 - 120	111 - 120	111 - 120	111 - 120
101 -110	101 -110	101 -110	101 -110	101 -110	101 -110	101 -110	101 -110	101 -110	101 -110
		Space is left after each 100pr for attaching labels							
91 - 100	91 - 100	91 - 100	91 - 100	91 - 100	91 - 100	91 - 100	91 - 100	91 - 100	91 - 100
81 - 90	81 - 90	81 - 90	81 - 90	81 - 90	81 - 90	81 - 90	81 - 90	81 - 90	81 - 90
71 - 80	71 - 80	71 - 80	71 - 80	71 - 80	71 - 80	71 - 80	71 - 80	71 - 80	71 - 80
61 - 70	61 - 70	61 - 70	61 - 70	61 - 70	61 - 70	61 - 70	61 - 70	61 - 70	61 - 70
51 - 60	51 - 60	51 - 60	51 - 60	51 - 60	51 - 60	51 - 60	51 - 60	51 - 60	51 - 60
41 - 50	41 - 50	41 - 50	41 - 50	41 - 50	41 - 50	41 - 50	41 - 50	41 - 50	41 - 50
31 - 40	31 - 40	31 - 40	31 - 40	31 - 40	31 - 40	31 - 40	31 - 40	31 - 40	31 - 40
21 - 30	21 - 30	21 - 30	21 - 30	21 - 30	21 - 30	21 - 30	21 - 30	21 - 30	21 - 30
11 - 20	11 - 20	11 - 20	11 - 20	11 - 20	11 - 20	11 - 20	11 - 20	11 - 20	11 - 20
1 -10	1 -10	1 -10	1 -10	1 -10	1 -10	1 -10	1 -10	1 -10	1 -10

Figure 2 – Typical labelling of Network Boundary Distributor

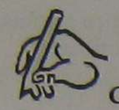
Complete the labelling on the following diagram of 4 x 27 way frames installed as a network boundary distributor:

1. Label the vertical frames.
2. Indicate the numbering of the modules eg. 1-10, 11-20 etc.

Figure 3

7.5.1.6 Cross Connections at a Network Boundary Distributor

Read Clause 5.3.2.7 of AS/ACIF S009:2001.



Complete the following:

1. A cabler **is authorised to make** a connection on the carrier side of the distributor if, and only if, a pair has been ....., ..., ... or otherwise specified by the carrier for that customer service.

2. The cabling provider cabler **shall** enter or adjust the ..... details in the .....

Apart from the requirement to use the correct tool and enter or adjust the service details in the records, there is also provision for removal of "dead or redundant" cross-connections.

A carrier will often leave jumpers for cancelled services in-situ within distributors to provide the opportunity for the services to be taken up 'in place' by an incoming customer at a lower cost. Nevertheless, not all cancelled services are taken up in place, and eventually old jumpers for cancelled services (called 'dead' jumpers) may accumulate to a stage where they clutter up the NBD and tie up spare pairs in the customer cabling connected to the customer side of the NBD. It then becomes necessary to identify and remove dead jumpers to free up pairs in the customer cabling.

A cabling provider must take all reasonable steps to ensure a working service is not affected when removing dead jumpers. Procedures for proving whether a jumper is redundant or not will be covered in the installation module of the course.

7.6 Non-distributor Premises (eg. domestic)

7.6.1 Network Termination Devices

Read Clause 5.3.3 of AS/ACIF S009:2001.

Complete the following:

1. A cabling provider is ..... to connect customer cabling to the connectors on the customer side of the NTD ..... or ..... a pair has been tagged, labelled or recorded by the carrier.

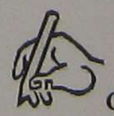
2. Is a cabling provider authorised to use a disconnect contact or removable link in an NTD for isolation or test purposes? YES or NO

Cablers with a Restricted license/registration are only permitted to work in premises that do not have a distributor installed at the network boundary.

7.6.1.1 Network Termination Device Enclosure (NTDE) Locations

Read Clause 5.3.4 of AS/ACIF S009:2001.

The recommended location for an NTDE located at a building is near the electrical enclosure. If the NTDE is to be installed by the cabling provider, the position of the NTDE should be discussed with the carrier.



Complete the following:

1. The highest terminal or socket in the NTDE shall not be greater than .....
2. The lowest terminal or socket in an NTDE shall not be less than .....
3. The NTE shall have a minimum protection of..... if in a .....exposed to the weather.

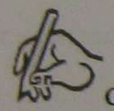
7.6.2 Other Cabling Access Points

In premises where there is no distributor or network termination device installed the carriers lead in cable may be terminated at any of the following:

- 610 sockets
- 611 sockets
- Modular socket
- Changeover switch
- Terminal strip of obsolete wall phones (rotary dial type)

Clause 5.3.5 of AS/ACIF S009 applies for these installations. Connection to the carriers network is only allowed at these points and not at any other junction or terminal box where the lead-in cable may be jointed by the carrier.

Read Clause 5.3.5 of AS/ACIF S009:2001.



Complete the following:

1. The cabling provider ..... connect to lead-in cable connection ..... or ..... other than those described in clause 5.3.5.1.

7.7 Self Help Questions

1. The Network Boundary of a carriers network in a domestic residence can be defined as:
   (a) The aerial cable terminal box on the pole outside the domestic premises.
   (b) The first socket where the lead-in cable is terminated.
   (c) A fascia or other connector block, from which, the first telephone socket is directly wired.
   (d) The first socket wired from a distribution frame.

2. Who enters the service details of new network line terminations in the network boundary distributor records?
   (a) The carrier's staff or the licensed cabler who has authorisation in writing to do the cross-connection.
   (b) The customer.
   (c) The building or premises owner.
   (d) The carrier.

3. Who can perform new cross-connections, which connect the carrier's network terminations to the customer cabling at the network boundary distributor?
   (a) Cross connections may be done by an appropriately licensed cabler where the lead-in cable pair has been tagged for the purposes of authorising a cabling provider to cross connect a service to customer cabling.
   (b) A licensed cabler shall not perform cross connections.
   (c) The customer may perform cross connections provided that the carrier has entered the service details on the network boundary distributor records.
   (d) A licensed cabler may perform cross connections provided that the customer has given written authorisation.

4. Complete the following: The backmount for the carrier's lead-in is installed by
   (a) The carrier's staff when they supply the modules and terminate the lead-in cable.
   (b) The customer because everything but the lead in is customer cabling.
   (c) The building or premises owner.
   (d) The licensed/registered cabling provider.

5. For a network boundary distributor the minimum clearance between any enclosed termination equipment on the lead-in cable, and the inside face of the cover or door is:
   (a) 150 mm
   (b) 50 mm
   (c) 80 mm
   (d) 30 mm

6. A network boundary distributor may be installed
   (a) Within a cupboard containing a fire hose reel providing the distributor is above the reel.
   (b) In a boiler room.
   (c) In a closet with the LV power distribution board.
   (d) In a room with an open fire sprinkler.

7. Distributors used at the network boundary must:
   (a) Be fitted with a lock.
   (b) Have provision for a lock.
   (c) Be fitted with a catch.
   (d) Have provision for securing with a key, lock or tool.

8. Which side of the network boundary distributor must be capable of mounting the carrier's standard terminating modules?
   (a) The lead-in side.
   (b) The customer side.
   (c) Both lead-in and customer sides
   (d) Either side, as any approved terminating module is suitable for both lead-in and customer sides.

9. The network boundary distributor enclosure when located outdoors and exposed to the weather, must have a minimum protection rating of:
   (a) IPX3
   (b) IPX6
   (c) IPX7
   (d) IPX8

10. The distance from walked on surface to lowest termination on an NTDE must not be less than:
    (a) 150 mm
    (b) 350 mm
    (c) 1300 mm
    (d) 1800 mm

11. What type of termination block may a licensed cabler provide on the customer side of a network boundary distributor?
    (a) Any type approved by the carrier
    (b) Only Krone LSA Plus modules
    (c) Any type
    (d) Any compliant type

12. When can an open registered cabling provider, install cross-connections to the lead-in cable?
    (a) Under the direct supervision of the carrier's technician.
    (b) With written permission from the carrier.
    (c) When licensed by the ACA or under the direct supervision of a licensee.
    (d) Under no circumstances can a licensee install cross-connects at the network boundary.

13. Where is the preferred location of an NTDE?
    (a) Anywhere an public property.
    (b) Anywhere the cabler decides to install it.
    (c) Near the electrical enclosure as discussed with the carrier
    (d) Anywhere the customer wants it.

14. What is the maximum height specified in AS/ACIF S009:2001 for terminations of an outdoor network boundary distributor or NTDE?
    (a) 1.8 metres
    (b) 350 mm
    (c) 4 metres
    (d) 6 metres

15. Who provides and terminates the lead-in cable(s)

(a) The customer.

(b) The building owner.

(c) The licensed cable installer.

(d) A cabler representing the carrier.

16. The definition of the property entry point is:

(a) The point on customer premises where the customer cabling enters the premises.

(b) The point on customer premises at which the network boundary distributor or the first socket is located.

(c) The point on a customer premises where a carrier's lead-in cable enters the premises.

(d) The point within a building on a customer's premises where the lead-in cable enters the building.

17. Refer to AS/ACIF S009:2001 Appendix A and add the clearances indicated by the arrows on the diagram below.

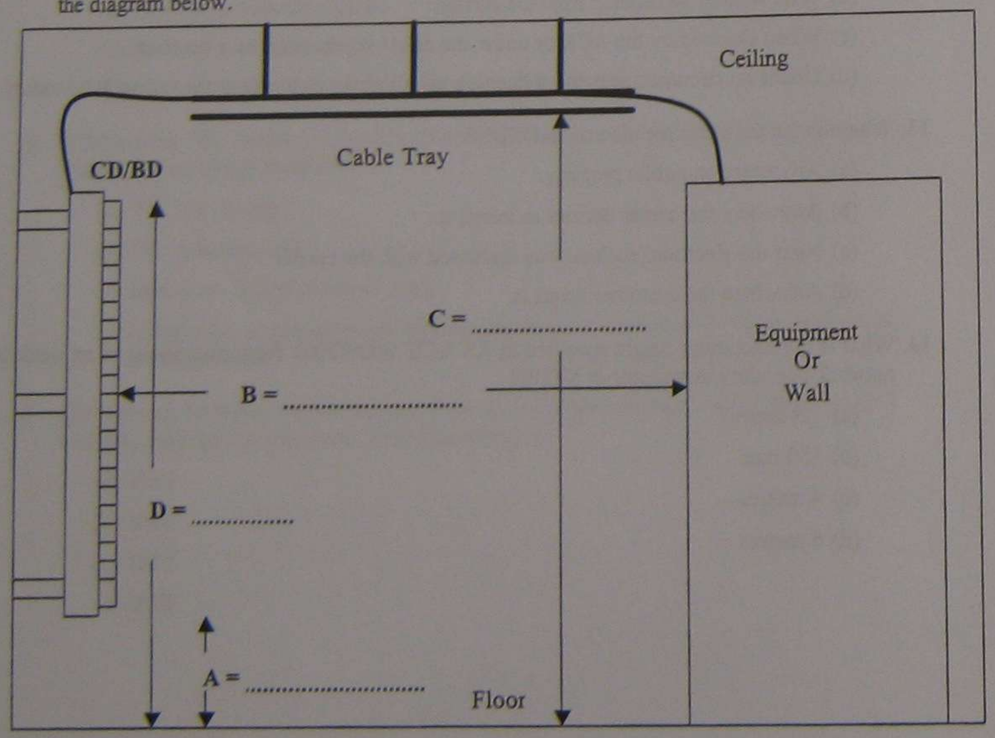


Figure 4

Section 8 Cabling – General

8.1 Introduction

Purpose

To develop knowledge of the regulatory requirements concerning the general requirements for installation of customer equipment, cable and cabling products, beyond the network boundary.

Objectives

At the end of this section successful participants will be able to:

- Describe the general conditions that apply to cable installation work.
- Understand the requirements for sharing cable sheaths with non-network connected services.
- Explain the effect and potential hazard to cablers of Earth Potential Rise.
- Refer to the relevant industry standards for coaxial and fibre cabling installations.
- Refer to industry standards applicable to Explosive atmospheres (hazardous areas).
- Describe the requirements for installing cabling terminations in the same enclosure as LV cabling terminations.
- Understand how orange pipe can be used for enclosing customer cabling.
- Detail the general requirements for distributors.
- Specify the applicable classes of surge suppressor for use on customer cabling.
- Apply the criteria for considering low frequency induction..

Resources

The following resources are required to complete this section:

- Standards Australia Communications Cabling Manual
- NTE005 Learner Resource

8.2 Important Terminology

Catenary wire support system

A system, such as a wire rope, suspended between two points to provide support for cable(s) attached to it at suitable intervals.

Customer cabling

All telecommunication cabling on customer's premises beyond the network boundary, covering both indoor and outdoor cables.

Customer equipment

Equipment that is, or intended to be, connected to a telecommunications network operated by a carrier or carriage service provider. Operation, or intended operation, of the equipment is beyond the boundaries of such telecommunications network.

Activity

Other definitions that are applicable to cabling installation also need to be understood, look up the definition of the following terms in AS/ACIF S009:2001 Part 4 and write your response.

1. Summarise the definition of Low Frequency Induction

   .....

   .....

   .....

2. Summarise the definition of Hazardous Service

   .....

   .....

   .....

3. Summarise the definition of Low Voltage

   .....

   .....

   .....

4. Summarise the definition of High Voltage

   .....

   .....

   .....

5. Summarise the definition of Extra Low Voltage (ELV)

   .....

   .....

   .....

6. Summarise the definition of Earth Potential Rise (EPR)

   .....

   .....

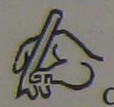
   .....

8.3 Installation standards and conditions

Cable and cabling equipment must be installed so that under their normal use the installation or equipment does not expose carrier personnel, cabling providers, customers or any other persons to any danger.

Nor should the installation adversely affect the proper functioning of the telecommunications network. (Refer to AS/ACIF S009 Clause 2.2)

Read Clauses 5.1.1.1 to 5.1.1.5 of AS/ACIF S009:2001.



Complete the following:

1. Customer cabling shall be installed in accordance with the appropriate requirements of AS/ACIF S009:2001 and the generally accepted principles of ..... and ..... practice.

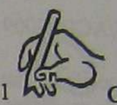
2. Cable and other cabling equipment ..... be installed in accordance with the ..... instruction.

3. All parts of an installation shall be ..... protected.

Minimum mandatory requirements are indicated by the words **"shall or shall not"** in AS/ACIF S009:2001. All other specifications are recommended or good practice. If these are adhered to, then sound and safe practice will be addressed. If a manufacturer specifies a particular installation requirement, then this also becomes mandatory by way of clause 5.1.1.3.

8.4 Cable joints

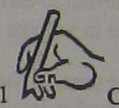
Incorrect jointing devices and procedures are the cause of many cabling faults. Procedures for jointing cables will be covered in the installation section of the course.

Read Clause 5.1.2 of AS/ACIF S009:2001  **Complete** the following:

All joints ..... be suitably ....., ...

positioned and supported to prevent the ingress of ..... and .....

8.5 Safety and Integrity of Telecommunications Networks

Read Clause 5.1.3 of AS/ACIF S009:2001  **Complete** the following.

What can the carrier do in relation to customer cabling and equipment on a line that is a threat to the integrity of their network?

.....

.....

.....

8.6 Earth potential rise

Read Clause 5.1.4 of AS/ACIF S009:2001.

Complete the following.

1. What EPR voltage level is specified, that if it can be exceeded under power fault conditions, requires alternative installation measures to be taken?

   Answer: .....Va.c.

During High Voltage (HV) power earth faults, current flowing through the earthing systems of HV poles and towers raises the voltage of the earthing systems and the surrounding soil with respect to remote earth.

When an electrical fault conducts current to earth, the earth potential, (depending on the soil conductivity at the location) will rise in voltage until protection circuits operate.

This is a problem if people are in the area, as they may step between or touch two voltage levels at the same time, because the voltage level is less as the distance from the fault source increases.

The other hazard comes from an earth source at near zero potential, being present in the EPR zone. This occurs when a line from a telephone exchange (which is grounded behind the battery) is present in the EPR zone thus producing two earth voltages when a cabler may be working on a cable pair or network connected equipment.

The rise in voltage (ie. potential) can be hazardous and is known as Earth Potential Rise (EPR) - it may occur at any time at or near a HV pole or tower.

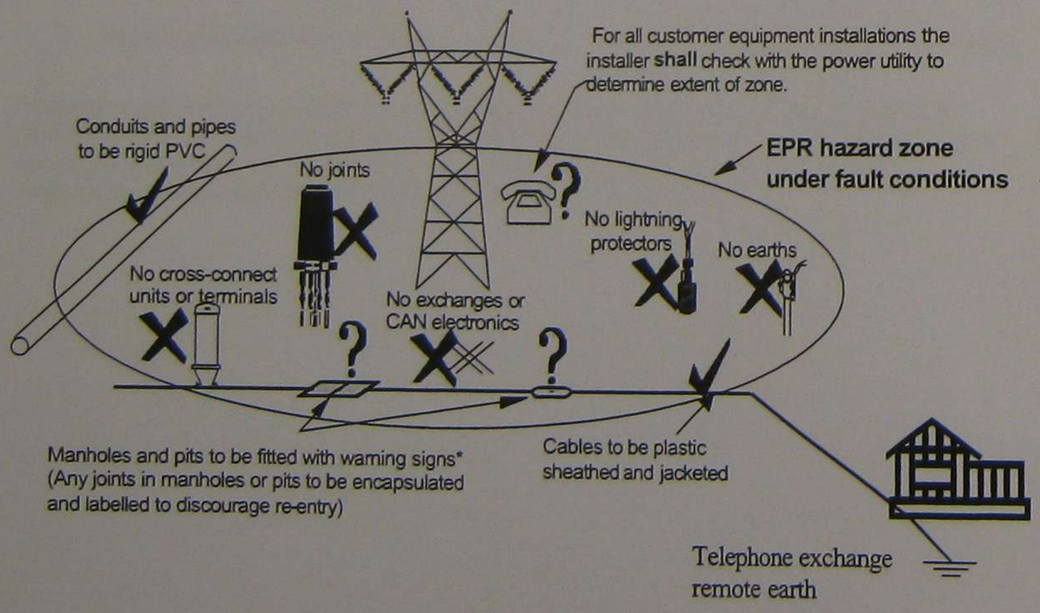
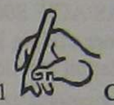


Figure 5

8.7 Low Frequency Induction

Telecommunications cables installed in the vicinity of HV power cables may have voltages induced in them due to the inductive coupling effect of the power line.

Read Clause 5.1.5 of AS/ACIF S009:2001



Complete the following statements.

1. Customer cables that contain .... elements should not be installed in the vicinity of a HV power line where it is expected the 50 Hz induced voltages under a ..... condition on the line may exceed .....V.

8.8 Alterations and additions

Read Clause 5.1.6 of AS/ACIF S009:2001.

This clause means that all current work undertaken must comply with AS/ACIF S009:2001, but existing installations do not have to be re-worked to current standards.

A licensed cabler has a responsibility under the obligations of the Workplace Health and Safety Act 1995, to inform his customers of any hazardous cabling situations he may encounter on their premises.

Read Section 5 of Module 1 (HB243:2000) which provides a further explanation of the requirements for alterations and additions to existing cabling.

8.9 Coaxial and optical fibre systems

Read Clause 5.1.7 & 5.1.8 of AS/ACIF S009:2001, these clauses provides details of

- The listed Australian Standard that deals specifically with laser hazard warning labels and installation guidelines, and the requirement to comply with AS/ACIF S008:2001.
- Basic safety requirements when working with optical fibre systems.
- A standard that is in draft form (now AS 3815) relating to coaxial cabling.
- Restrictions that apply when connecting coaxial cables to a telecommunications network.

8.10 Explosive atmospheres

Read Clause 5.1.9 of AS/ACIF S009:2001, this clause provides industry standards to comply with when installing customer cabling in hazardous areas. A typical area may be a flourmill, a chemical plant or a modern installation at a liquid fuel dispenser.

In practice (depending on the degree of danger), Hazardous areas are defined in terms of class and zones. For example a 'Class 1 Zone 2' hazardous area.

Site owners should be consulted to determine area classification prior to works commencing.

AS3000:2000 (electrical wiring rules), Section 7.9 defines these hazardous areas as follows:

(a) **Class 1**

1. Class 1 areas are those areas in which flammable gases or vapours are or may be present in the air in sufficient quantities to produce an explosive gas atmosphere. Within Class 1, three zones are recognised as follows:

   (i) **Class 1 Zone 0** -an area in which an explosive gas atmosphere is present continuously, or is expected to be present for long periods.

   (ii) **Class 1 Zone 1** -an area in which an explosive gas atmosphere is likely to occur in normal operation.

   (iii) **Class 1 Zone 2** -an area in which an explosive gas atmosphere is not likely to occur in normal operation and if it does occur it will exist for a short period only.

(b) **Class II**

- Class II areas are those areas which are hazardous because of the presence of combustible dust, fibres or flyings.

8.11 Catenary support systems

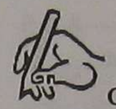
Read Clause 5.1.10 of AS/ACIF S009:2001.

If a shared catenary with power is used then separation is required or a barrier used. If site specifications require that the catenary wire be earthed, then the TRC **is not** to be used for this purpose. (Even though the catenary may carry a TRC).

8.12 Cable terminations and associated single insulated conductors

8.12.1 Separation from electrical services

Read Clause 5.1.11.1 & 5.1.11.2 of AS/ACIF S009:2001, this clause details the requirements of separation between terminations of telecommunications cables and those of electrical cables.



Complete the following statements.

1. Why must telecommunications terminations be enclosed?

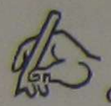
   To prevent ..... by

   a person who is not doing cabling work.

2. When uninsulated terminations of LV power are located in the same enclosure as telecommunications conductors and terminations, then accidental contact with the LV service must be ..... by ..... means.

3. The conductors and terminations of telecommunications cables **shall** be separated from single insulated conductors and terminations of LV cables by either a minimum distance of ..... mm or by means of a permanent rigidly fixed ..... of insulating material or ..... . If the barrier is metal, it **shall** be bonded to the protective ..... conductor via a minimum 2.5 mm^2 green/yellow conductor.

Read Clause 5.1.11.3 of AS/ACIF S009:2001



Complete the following statements

The conductors and terminations of telecommunications cables **shall not** be located within the same enclosure as conductors and terminations of HV cables. The enclosed conductors and terminations of telecommunications cables **shall** be separated from conductors and terminations of .....

..... HV cables by a minimum distance of .....mm, irrespective of whether there is an interposing .....

Refer to Module 2 HB29:2000 pages 14-16 in the CCM, for a diagrammatic form of these requirements.

Separation or barriers are specified to prevent conductors from contacting the terminations of other services, if they happen to pull out from their termination for any reason.

High voltage terminations are a hazardous environment and must be kept clear of. Under certain conditions a flash-over can occur, let alone the safety risk of cablers working near HV terminations.

8.13 Separation from non-electrical hazardous services

Read Clause 5.1.12 of AS/ACIF S009:2001.

Complete the following.

The minimum separation distance from non-electrical hazardous services is specified as .....

.....mm.

A diagrammatic form of this requirement is shown in Module 2 HB29:2000 page 23.

8.14 Separation from lightning down conductors

Read Clause 5.1.13 of AS/ACIF S009:2001.

Answer the following question:

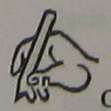
If separation of customer cabling and equipment by greater than 9 metres from the down conductor can be achieved, then is reference to AS 1768 required?

Answer: Yes / No

Refer also to Module 2 HB29:2000 page 21

8.15 Power/earth feeding

Read Clause 5.1.16 of AS/ACIF S009:2001.



Complete the following statement.

When customer cabling is used for power feeding, the cabling shall be.....

from excessive.....flow.

8.16 Conduits

Read Clause 5.1.14 of AS/ACIF S009:2001 including all the **NOTES**.

Answer the following:

1. When can the ends of an existing conduit/pipe of a colour designated for a hazardous service, be made white in a durable manner?

   Answer: When the conduit/pipe is ..... in concrete or

   .....under .....concrete.

2. When can an existing conduit/pipe of a colour designated for a hazardous service be sub-ducted for communications use?

   Answer: When it does not contain a .....service.

3. If a single mode fibre cable having no conductive elements is installed within a pipe containing a hazardous electrical service, then what is the safety requirement specified?

   Answer: That the fibre cable be ..... at all ..... with a

   suitable warning that it .....light source.

4. Can customer cables containing electrically conductive elements, share a duct, pipe, single compartment (skirting duct, facility pole etc) as cables of a hazardous service?

   Answer:.....

   .....

   .....

Table 1 of AS/ACIF S009:2001 and HB29 – 2000 clause 3.2.2.2 (page 47) provides information on the conduit colours for other services.

8.17 Surge Suppression Devices

A carrier will provide surge suppression devices at the network boundary on a service which is located in a known surge risk area eg. lightning. Where user equipment is not in the building where the network boundary is located, then a licensed cabler must assess the need for surge suppression as detailed in clause 5.1.17. (These requirements are specified to enable cablers to fit suppression devices to customer cabling in risk areas.)

Read Clause 5.1.17 of AS/ACIF S009:2001.

Complete the following statements.

1. An AS 4117 - class 1 or class 3 device can be used within a .....

   ..... or NTDE and a class .....device at any other location.

2. A class 1 device will have a nominal firing voltage of .....V or greater, whereas a

   class 3 device will have a nominal firing voltage of .....V or greater.

The following is an overview of a gas filled surge suppressor.

A combination of electrode spacing and gas type will determine the firing voltage of the suppressor.

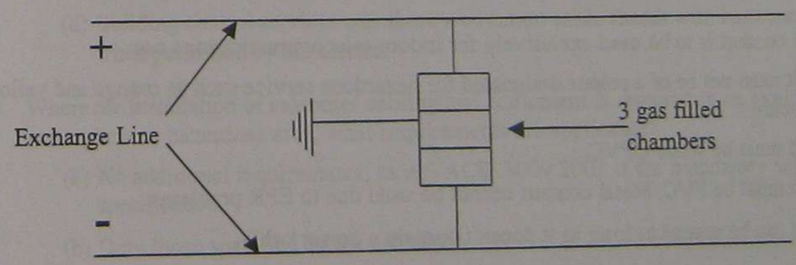


Figure 6

The centre and one or both of the outer chambers will ionise, providing a low resistance path to earth for surge current on a line. The gas will return to the inert state when surge current diminishes. The suppressor will handle many surges but will eventually need to be replaced.

8.18 Self Help Questions

1. Cables for telecommunications services must be separated from non-electrical hazardous services by a minimum distance of:
   (a) 150mm
   (b) 300mm
   (c) 450mm
   (d) 100mm

2. Ensuring separation from other services is the responsibility of:
   (a) The registered cabling provider.
   (b) The customer.
   (c) The ACA.
   (d) The carrier.

3. In AS/ACIF S009:2001, cables carrying low and high voltages are:
   (a) Harmful services.
   (b) Hazardous services.
   (c) Harmful electrical services.
   (d) Non-hazardous services.

4. Where a conduit is to be used exclusively for indoor telecommunications use:
   (a) It must not be of a colour designated for hazardous service such as orange and yellow ochre.
   (b) It must be white UPVC.
   (c) It must be PVC. Metal conduit cannot be used due to EPR problems.
   (d) It can be orange as long as it doesn't contain a power cable.

5. The licensed cabler or equipment installer must check with the power supply authority as to the extent of the EPR hazard in proposed locations where the installation has an electrical supply exceeding:
   (a) 250 V a.c.
   (b) 415 V a.c.
   (c) 430 V a.c.
   (d) 1000 V a.c.

6. The installation of customer equipment or cabling must be such as to not cause harm or interference to the public telecommunications network. Where such installation does pose a threat to the safety or proper functioning of the network:
   (a) The carrier will rectify the equipment or wiring causing harm or interference.
   (b) The carrier may cease to supply service to the licensee installing the equipment or cabling.
   (c) The carrier may cease to supply service to the installation.
   (d) The carrier may seek a review from AUSTEL.

7. The definition of Customer Equipment in the CCM, is:
   (a) Equipment that is or intended to connect to a telecommunications network operated by the Australian Government.
   (b) Any cabling or equipment on customer premises beyond the network boundary.
   (c) Equipment that is or intended to be connected to a telecommunications network operated by a carrier is used or is intended for use beyond the boundaries of that network and has a Telecom permit.
   (d) Equipment that is or intended to be connected to a telecommunications network operated by a carrier and is used or is intended for use beyond the boundaries of that network.

8. When can customer cabling including building control services be located in a common sheath?
   (a) Only in multi-level building where separate cable runs would be constrictive.
   (b) Only when the building control services are not harmful or hazardous.
   (c) Under no circumstance can building control services share a common cable sheath with customer cables.
   (d) Building control services can share a common cable sheath with customer cables when permitted by the carrier.

9. Where the installation of customer cabling and equipment is required in an explosive atmosphere or hazardous area, what requirements are applicable?
   (a) No additional requirements, as AS/ACIF S009:2001 is the mandatory self contained specification.
   (b) Only those specified by the customer.
   (c) Observance of the additional Australian Standards applicable to these situations as specified in AS/ACIF S009:2001.
   (d) The work is to be inspected by a representative of the relevant government department upon completion.

10. What are three suitable methods for jointing cable in the wiring rules?

1) .....

2) .....

3) .....

11. A licensed cabler proposes to make an addition to an existing block cabling installation. To comply with licence conditions, the new installation:

(a) Must be installed to the previous installation standards used.

(b) Must be installed to the current ACA standards.

(c) Must be installed using both old and new standards.

(d) Must pass inspection by the local electrical supply authority.

12. How is segregation between LV power terminations and conductors, and adjacent telecommunications terminations and conductors, achieved in a shared enclosure?

(a) By providing a shared enclosure, which meets double insulation requirements specified in AS 3000.

(b) By the installation of a metallic screen connected to the Telecommunications Reference Conductor.

(c) By maintaining the minimum specified clearance of 50 mm between the terminations.

(d) By incorporating a permanent rigidly fixed barrier of durable insulating material, or metal connected to the building protective earth.

13. If, as a licensed cabler, you are directed to install conductors and terminations of telecommunication cables within an enclosure with high voltage multi-core cable terminations, would you:

(a) Physically separate the conductors or terminations by installing the telecommunication cables within a PVC duct in the enclosure.

(b) Separate the high voltage terminations from the telecommunications terminations in the enclosure by a physical distance of not less than 150 mm.

(c) Not proceed with the installation and advise your customer that telecommunications terminations shall not be located in the same enclosure as high voltage terminations cables.

(d) Separate the high voltage terminations from the telecommunications terminations at their closest points by a physical distance of not less then 300 mm.

14. What protection shall be provided when a cable is used for power feeding

.....

.....

.....

Section 9 Indoor Cabling

9.1 Introduction

Purpose

To develop knowledge of the regulatory requirements concerning the installation of indoor customer equipment, cable and cabling products, beyond the network boundary.

Objectives

At the end of this section successful participants will be able to:

- Outline the regulatory requirements for the installation of indoor customer cabling.
- State the minimum separation required between customer and other services in indoor locations.
- Delineate restricted zones within wet areas.
- Suggest suitable customer equipment for installation within wet area restricted zones.
- Outline the restrictions placed on cables installed in lift and hoist shafts.
- Detail requirements for indoor conduit, duct and tray support systems.

Resources

The following resources are required to complete this section:

- Standards Australia Communications Cabling Manual
- NTE005 Learner Resource

9.2 Installation of indoor cabling

Read Clause 5.4.1 of AS/ACIF S009:2001

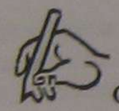
Where telecommunications cables pass through fire isolating walls, floors or in riser shafts, they must be suitably fire stopped in accordance with the relevant building codes.

It is important to separate all cables provided for services that connect to the telephone network, from hazardous electrical services.

Outdoor cable sheath that does not comply with the flammability requirements of cable designed for indoor use must be installed to comply with the building codes. This may be achieved by enclosing it in PVC or metal conduit or in a sealed riser duct to prevent it transporting a flame through a building.

9.3 Cables In Common Trunking Or Ducts

Read Clause 5.4.2.2 of AS/ACIF S009:2001.



Complete the following text.

1. Telecommunications cables that ..... electrically conductive elements and which .....trunking or ducts with .....cables e.g. skirting trunk, floor duct or service column, shall be run in a .....of the common trunking or duct provided the channel or duct is separated by a ..... and continuous barrier complying with Clause 5.4.2.1.1 (b).

2. Provision is allowed for breaks in the barrier at intersections of modular office furniture including abutments to service columns (due to assembly processes) where these can be .... provided that cables do not cross into other channels and have fixings fitted where required to maintain segregation at changes in direction of .... in the duct(s).

9.4 Separation from Hazardous Electrical Services

9.4.1 Separation from LV cables

The principle of separation of telecommunication cables from LV cables is not principally for induction reasons as this has little effect, (other than for long parallel runs) but for mechanical protection, to prevent crushing, piercing or fusion under heat, of the conductors of both cables, thus exposing users, cablers and carrier staff to hazardous voltages.

Cables can be separated by spatial (air gap) separation or by means of various barriers.

Read Clauses 5.1.15 & 5.4.2 of AS/ACIF S009:2001.

Complete the following text.

1. Customer cables that have steel wire armouring (SWA) that is terminated to a _____ are exempt from the separation requirements for LV and .....electrical cables provided the LV or HV cables also have an earthed .....and are fitted with _____leakage circuit breakers appropriate to the site requirements.

For a diagrammatic form of the above, see Module 2 HB 29:2000 Figure 2-15 of the CCM.

In this case for either LV or HV services, the barrier is the earthed steel mesh that surrounds both individual cables. The surge fault current that creates an inductive field is minimised by the ELCB.

2. Minimum separation of telecommunication and LV cables can be achieved by;
   - A minimum of..... mm or
   - A ..... of durable .....
   - Or building structural elements

For a diagrammatic form of the above, see Module 2 HB 29:2000 Figure 2-17 of the CCM.

9.4.2 Separation from HV cables

Read Clause 5.4.3 of AS/ACIF S009: 2001, inspect Figures 2-18, 2-19, 2-20 and 2-21 of Module 2 HB29: 2000 CCM.

Answer the following:

1. What is the minimum separation of metallic conductor telecommunication cables from single core HV cables, with or without a barrier?

   Answer: .....mm.

2. What is the minimum distance around a barrier, sheath to sheath, when a barrier is used with multi-core cables?

   Answer: .....mm.

3. What is the minimum distance allowed between HV multi-core cables and metallic conductor telecommunications cables when a barrier is not used?

   Answer: .....mm.

Explanation.

Here we have separation for induction under fault conditions and for mechanical separation. Single core HV has a strong magnetic field when greater currents flow under fault conditions, but when conductors are in a trefoil construction (multi-core), they tend to reduce the fields due to opposing phase differences.

The barrier height requirement for reduced separation to 150 mm minimum for multi-core HV cables is to endeavor to prevent objects from being across both cable sheaths at once and to protect the telecommunications cables should the HV cable "blowout" due to insulation and sheath failure when under stress from a surge current.

AS/ACIF S009: 2001 Clause 5.4.4 deals with the safety issue of not using flammable or volatile conduit in lift shafts or lift motor rooms, or in areas in excess of 60° C, where it may catch fire.

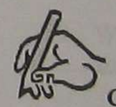
9.5 Cables installed in lift and hoist shafts

These receive special attention because of the design of travelling cables, where they are bundled or of a ribbon construction, incorporating hazardous electrical services.

Telecommunication circuits, that use conductors in a travelling cable, which have their own sheaths and are then bundled under an overall sheath with hazardous electrical circuits may comply to electrical withstand, but must be tested to prove this. Cables with unsheathed cores only, need isolation at both ends of the cable by means of a Line Isolation Unit (LIU). A telephone that also has the equivalent test compliance of a LIU can suffice at the lift car.

To install a travelling cable associated with a building lift or building maintenance unit, a Lift Mechanics License and Lift Premises Cabling License is required. A licensed cabler may be called in to install a telephone at a later date and needs to be aware of the cable type he is going to connect to.

Read Clause 5.4.6 of AS/ACIF S009:2001, this covers the requirements for cables in lift and hoist shafts,



Complete the following sentence.

If a travelling cable is not compliant to the relevant standards, as indicated by a positive compliance mark, then compliant .... devices are required to be fitted to the conductors of each telecommunications circuit in use, at .... of the common sheathed multi-core cable. A compliant liftphone may be used instead at one end.

9.6 Securing and supporting of cables

Read Section 3, Module 2 HB29: 2000 of the CCM. This section of Module 2 covers recommendations for cable pathways.

Read Clauses 5.4.5.1 & 5.1.1.3 of AS/ACIF S009:2001.

Complete the following statements.

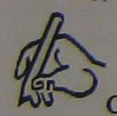
1. Cables shall be suitably ..... and ..... as necessary to maintain ..... from hazardous services.

2. Cable and other equipment shall be installed in accordance with ..... instructions, including in the case of cable such things as cable ....., ..., ..., colour code etc.

Manufacturers instructions are applicable here as per clause 5.1.1.3.

9.7 Undercarpet wiring

Read Clause 5.4.2.3 and 5.4.8.1 of AS/ACIF S009:2001.



Complete the following:

Apart from the 50 mm minimum parallel separation and the right-angled crossover, what else is required at the crossover?

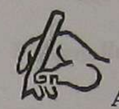
Answer: A ..... bonded to the building .... via a ..... mm 2 conductor, the barrier extending at least ..... mm beyond the cable sheaths of both systems.

With the resultant lump in the carpet, few crossovers may eventuate.

9.8 Installation in damp situations

AS 3000:2000 Section 7 covers the requirements for installations in areas such as damp situation restricted zones.

Read Clause 5.4.7 of AS/ACIF S009:2001, this covers the requirements for installing customer cables in damp situations.



Answer the following questions.

1. Can TO's be installed within the wet area restricted zones?

   .....

   .....

2. What are the requirements for installing CE sockets in damp situations outside the restricted zones?

   .....

   .....

3. What degree of protection (IP rating) must customer equipment in bathrooms have?

   .....

4. What degree of protection (IP rating) must customer equipment in shower rooms have?

   .....

9.8.1 Telecommunications Outlets (TO's)

TO's are barred in areas where water can avail human contact with TNV at a TO, and with earth because of the conductive environment. Also the proximity to water can cause electrolysis if it enters the TO. This, as for electrical outlets is for safety; hence AS/NZS 3000:2000 is called up.

9.8.2 Equipment other than TO's

Equipment may be installed in the restricted zones, but it must be IP rated. (When equipment is wall mounted the TO is enclosed behind the equipment and is not exposed to the issues of clause 5.4.7.2.)

It is not advisable to install customer equipment in such areas.

9.6 Securing and supporting of cables

Read Section 3, Module 2 HB29: 2000 of the CCM. This section of Module 2 covers recommendations for cable pathways.

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Complete the following statements.

1. Cables shall be suitably ..... and ..... as necessary to maintain ..... from hazardous services.

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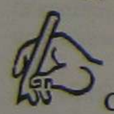

Complete the following:

Apart from the 50 mm minimum parallel separation and the right-angled crossover, what else is required at the crossover?

Answer: A ..... bonded to the building .... via a ..... mm 2 conductor, the barrier extending at least ..... mm beyond the cable sheaths of both systems.

With the resultant lump in the carpet, few crossovers may eventuate.

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   .....

   .....

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9.8.1 Telecommunications Outlets (TO's)

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It is not advisable to install customer equipment in such areas.

IP RATING (Explanation)

The IP (international protection rating) of AS 1939 details an X where no parameters are specified for that field (the X field in this case deals with the intrusion of dust and probes [fingers wires etc. These are covered by AS/NZS 3260]).

The next numeral, which reads to a maximum value of 8, gives the test for the resistance to the penetration of water.

Section 4.3.5.1 in Module 2HB 29:2000 explains the IP ratings in more detail.

Rating Example Exposure

- IPX8 - Underground Encl. - Terminations full submersion (24 hr test)
- IPX7 - Bathroom - Temporary submersion
- IPX6 - Shower - Forced jets of water- all directions
- IPX3 - Distributors & TO's - Water sprinkled to an angle of 60 deg. from above.

9.9 Distributors

Section 5.2 of AS/ACIF S009:2001 applies to all distributors installed in the customers premises where telecommunications cables are terminated. Additional requirements apply if the distributor is to be used as a network boundary. Section 5.3 of AS/ACIF S009:2001 details the additional requirements for network boundary distributors.

Read Clauses 5.2.2 to 5.2.4

Complete the following statements.

Records

Where cross connections are made by means of jumpers, the registered cabling provider **shall** supply sufficient information pertaining to the cabling work performed to enable ..... and ..... to be correctly ..... and .....

Records **shall** be ..... and up-dateable.

This requires as a minimum, the cross-connect details, but not the service details etc as this involves privacy issues.

Outdoor installation

If a distributor is installed where it is exposed to the weather, it shall have a minimum degree of protection of ..... to AS 1939.

This degree of protection can be increased where the situation warrants it, but as a minimum rating it allows ventilation from underneath to prevent moisture build up in humid areas. Moisture in cables and terminations causes noise/crosstalk and loss of signal, especially in circuits utilising metallic pair cables.

Construction

If an enclosure is made by a manufacturer or built on site, it must comply with some minimum requirements.

The enclosure shall be free of ..... or .....

Conductive enclosures shall have provision for connecting to a ..... or ..... conductor.

9.10 Self Help Questions

1. When can a cable that does not meet the requirements for indoor use be installed indoors?
   a. A polyethylene-sheathed cable cannot be installed indoors because it does not pass the flammability test required by AS/ACIF S008:2001.
   b. These can be installed indoors at any time because flammability of the cable sheath will not affect a carrier's network.
   c. When the cable is installed in a conduit or sealed riser thus ensuring compliance with the building code.
   d. When any wall penetrations are fire stopped to ensure a flame is not carried through them by the cable sheath.

2. Joints in indoor customer cables must be:
   a. Wholly concealed in a suitable enclosure or wall, floor or ceiling space.
   b. Suitably manufactured, enclosed, positioned and supported to prevent the ingress of dust or moisture.
   c. Suitably concealed from public view and protected interference or damage.
   d. Suitably insulated and protected to prevent injury to customers.

3. What is the requirement for installing Telecommunication Outlets (TO's) in damp situations outside the restricted zones defined in AS 3000?
   a. The installation of TO's in damp situations outside the restricted zones must be in such a way as to minimise the ingress of moisture.
   b. There are no requirements for the installation of TO's in damp situations.
   c. TO's installed in damp situations must be within an enclosure not inferior to IPX4.
   d. It is not permissible to install TO's in damp situations outside the restricted zones.

4. What is the minimum segregation between telephone cables and HV single core cables when a barrier of durable insulating material placed between the two cables is of such size that the distance around the barrier is 185 mm?
   a. The minimum segregation between HV single core cables and telephone cables is 150 mm.
   b. The minimum segregation between HV single core cables and telephone cables is 300 mm without a barrier and 150 mm with the barrier.
   c. For enclosed cables there is no need for further segregation. In all other cases it is necessary to maintain 450 mm separation irrespective of any interposing barrier.
   d. The minimum segregation between HV single core cables and telephone cables is 450 mm irrespective of any interposing barrier.

5. Power and a customer cable enter a standard floor outlet from the ceiling space below, via a 32 mm diameter hole drilled through the concrete floor. What requirement must be observed for installation of the customer cabling to comply with mandatory separation requirements?
   a. The 240-volt power cable shall be double insulated and earthed at a power switchboard.
   b. The data cable installed shall be shielded twisted pair cable with the shield and drain wire connected to the protective earth.
   c. The telephone wiring shall be separated from the other cables by more than 100 mm before entering the floor penetration.
   d. The telephone wiring shall be enclosed in a PVC conduit which provides an insulated barrier from the other cable in the 32 mm diameter hole.

6. An installation in a building has one perforated cable tray suspended from the ceiling. A request has been made to install the telecommunication cables on the tray with LV and multi-core HV cables. What segregation is required to comply with AS/ACIF S009:2001?
   a. The separation between the LV cable and the telephone cable must be 50 mm unless there is an interposing barrier between the cables. The separation between the multi-core HV cable and the telephone cable must be 450 mm or 150 mm where there is an interposing barrier. The interposing barrier must be of such dimensions that at every point the shortest path around the barrier between the telephone cable and HV cable is at least 175 mm measured from cable sheath to cable sheath.
   b. The separation between the LV cable and the telephone cable must be 50 mm unless there is an interposing barrier between the sheaths of the cables. The separation between the multi-core HV cable and the telephone cable must be 300 mm or 150 mm where there is an interposing barrier. The interposing barrier must be of such dimensions that at every point the shortest path between the telephone cable and HV cable is at least 175 mm measured from cable sheath to cable sheath. The barrier may be of durable insulating material or earthed metal.
   c. The separation between the LV cable and the telephone cable must be 50 mm unless there is an interposing barrier between the sheaths of the cables. The barrier may be of durable insulating material or metal. The separation between the multi-core HV cable and the telephone cable must be 450 mm regardless of any interposing barrier.
   d. No separation is required on cable trays as separation is not critical.

Section 10 Outdoor cabling

10.1 Introduction

Purpose

To develop knowledge of the regulatory requirements relating to the installation of customer equipment, customer cabling and cabling products, for outdoor installations beyond the network boundary.

Objectives

At the end of this section successful participants will be able to:

- Outline the regulatory requirements for the installation of underground customer cabling.
- Outline the required precautions to protect underground customer cabling.
- State the minimum required separation between customer cabling and other underground services.
- State the minimum installation depths for underground customer cabling.
- Outline the regulatory requirements for the installation of aerial customer cabling.
- State the requirements for crossings of power lines.
- Understand the requirements for sharing poles and pole routes with power lines.
- Understand the reasons for separation and clearances associated with outdoor cabling.
- Detail the requirements applicable to installations of Line Links and Network Units.

Resources

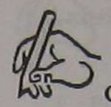
The following resources are required to complete this section:

- Standards Australia Communications Cabling Manual
- NTE005 Learner Resource

10.2 General

Outdoor cabling on a customer's premises is cabling, including line links between premises, which can be installed and maintained by a registered cabling provider.

Read Clauses 5.5.1.1 to 5.5.1.4 of AS/ACIF S009:2001



Complete the following:

1. As with previous references to protecting telecommunications outlets and equipment from splashing water, the minimum IP rating for outdoor TO's and customer equipment is .....

2. Cabling which is installed within a ..... or covered walkway between buildings may be treated as .....cabling provided that the conditions for outdoor surface cabling are met.

3. When conduit or pipe is used for the enclosure of outdoor telecommunications cable, then what identifying colour will be present if it is of non-metallic construction?

.....

Where cable is exposed to water or sunlight, polyethylene sheathed or equivalent cable should be used to reduce the effect of water "leaching" into the cable or the sheath drying out and failing, as happens to PVC sheathed cables. Carbon black is added to polyethylene sheaths to block out UV light rays, which deteriorate the cables insulative elements and cause breakdown of the cable. Hence if a cable is installed where it will be protected from exposure to elements of nature, it can have a PVC sheath.

If a cable is installed underground or exposed to weather, it should be one that is specified for this application, which will include a polyethylene sheath. These cables also have a greater core to sheath electric strength rating than indoor cable to counter EPR from lightning and power cable faults.

10.3 Line links

Line links between premises may be installed and maintained by carriers or carriage service providers and also by licensed cablers, where the direct distance between the properties does not exceed 500 metres. Some of the issues involved include local government approval, approval from pole owners to use their poles and the non-use of carriers' ducts and pits etc.

Network units (ie direct distances of 500 metres or greater between properties) may also be provided under certain circumstances. Whatever the installation criteria, AS/ACIF S009:2001 applies. See also, clauses relating to underground and aerial cabling. A more detailed explanation of line links and network units can be found in the CCM HB 243:2000 Section 4.

Line links are covered in further detail in NTC005 (Regulatory Framework 3).

10.4 Outdoor surface cabling

Read Clause 5.5.2 of AS/ACIF S009:2001 **Complete** the following:

1. When can indoor cable be used outdoors?

   Answer: When _____

   or _____

   _____

10.5 Underground cabling

Read Clauses 5.5.3 of AS/ACIF S009:2001 these clauses cover the specific installation requirements of underground customer cabling.

Pits & access holes Clause 5.5.3.1

Complete the following:

1. Pits and access holes shall be _____ and _____ labelled on the covers to _____ them from other services.

2. Shared pits for LV and HV power shall not be used except:

   - If the cable traversing the pit shall be _____ in a continuous run of _____ insulating conduit which is suitably identified.
   - The telecommunications cable does not contain _____ conductive _____

Due to practicalities of placing pits over shared trench conduit runs, the sharing of pits with power cables is allowed (but not encouraged), provided segregation of services is maintained as provided for in AS/ACIF S009:2001. The segregation is to prevent mechanical contact of the cable elements of each service. This could be by a pit lid crushing cables if dropped into a pit, the pit being crushed by a vehicle, or burning fuel or lightning fusing the cores together. If a service is "sleeved' through a pit, this at least offers a barrier to reduce the chances of conductor contact.

3. What are the requirements for installing pits or access holes in driveways?

   _____

   _____

4. Why is it recommended to seal entry holes of conduit/pipe into a pit?

   _____

   _____

Pillars and cabinets Clause 5.5.3.2

1. What are the requirements for pillars and cabinets installed in a public place?

.....

.....

Conduit and marking tape Clause 5.5.3.3

1. Underground cable installed under a ..... or .....
   shall be:
   - Enclosed in..... or
   - Covered by a white .....which identifies the service, installed a minimum of .....above the cable.

Cable type Clause 5.5.3.4

1. Cable installed underground shall be .....cable whether or not it is installed in a .....

Depth of cover Clause 5.5.3.5

2. What is the minimum depth of top cover for telecommunications cables installed underground, in the following situations:
   - Under a public footpath or roadway?
     .....mm.
   - Other than public footpath or roadway?
     .....mm.

Where shale or rock prevent the minimum 300 mm trench depth, the alternative cabling protection practices are:

- Cable installed in medium duty metallic conduit, installed so as not to be a hazard to pedestrians
- Cable installed in compliant conduit to a vertical surface such as a retaining wall or fence
- Installed under at least 50mm of aggregate concrete
- Use of steel wired armoured cable (SWA)

Crossing other services Clause 5.5.3.6

1. Where telecommunications cables cross power cables they should cross..... the power service.
2. Where a power cable, which is not enclosed in heavy-duty conduit or pipe, is required to cross above the telecommunication cable then a ..... must be placed above the ..... for ..... either side of the crossing.

This installed protection at the point of crossing is to prevent subsequent cablers from hitting the power cable first, if digging to access the telecommunications cable.

We will look closely at the separations in Table 2, shortly.

Running alongside electrical power cables/trenches Clause 5.5.3.7

When telecommunications cables run parallel with LV or HV services the separation distance may be measured ..... or .....

Shared trenches with other services Clause 5.5.3.8

1. When telecommunication cables cross over, or are installed in a shared trench with public utilities, then what are the separations required?

.....

.....

2. Where cabling is installed in a shared trench with LV cables and both services are installed in appropriately coloured conduits the minimum separation shall be.....

When calculating the depth of shared trenches you will need to take into account:

- Minimum distance from ground level to the upper most conduit
- Minimum separation requirements
- Conduit sizes of both services

The following information is intended to help you understand the principles applicable to underground separation of telecommunication services from hazardous electrical services. This applies to either a shared or an exclusive trench.

The basic premise for separation of underground cabling is to protect cablers from contact with hazardous services. This could be through subsequent access to the buried plant and accidentally making contact with hazardous services buried in close proximity to the telecommunications cabling. When we analyse the separation requirements, we find figures of 0mm, 100mm, 300mm & 450mm.

The basis for separation is, whether the power cable is protected or not.

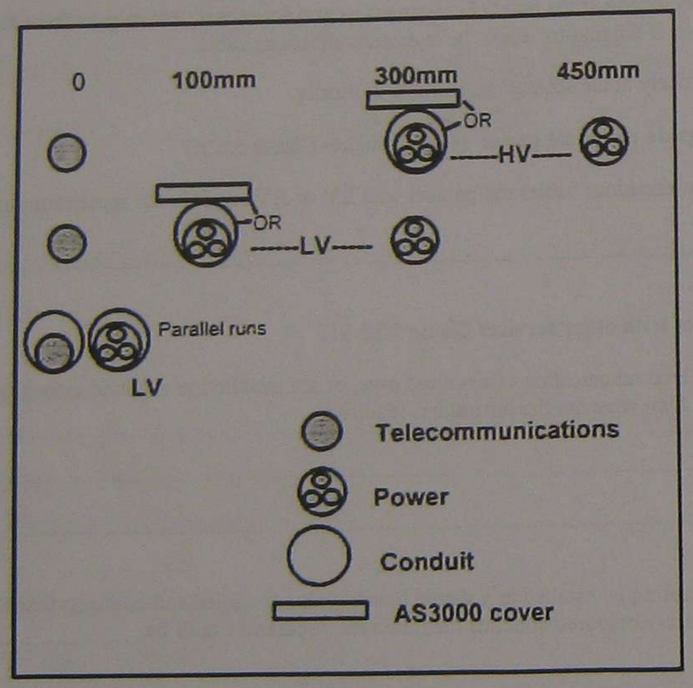


Figure 7

Note: This diagram does not represent the physical layout of cabling in a trench, but is provided as a learning aid to assist in understanding the basic principle of separation from hazardous electrical services in an underground installation.

Refer to Table 2 of AS/ACIF S009: 2001

For LV services

If both the customer cabling & power are enclosed in respective coloured conduit in a parallel run, then no segregation is required. Otherwise:

- If only the LV power cable is protected then maintain a minimum 100 mm separation.
- If the LV power cable is unprotected then maintain a minimum 300 mm separation.

For HV services

- If the HV power cable is protected then maintain a minimum 300 mm separation.
- If the HV power cable is unprotected then maintain a minimum 450 mm separation.

Similarly if the customer cabling crosses under an unprotected power cable, then a barrier must be placed on top of the power to prevent subsequent cablers from hitting the power cable first if digging to access the customer cabling.

Now analyse **Table 2** of AS/ACIF S009:2001 and by applying the criteria above as to "whether the power cable is protected or not" then the separations should be easily remembered.

Complete the following. Try to answer without referring to the text, by using the above "analogy" first and then check your answer.

1. The minimum separation from an unprotected HV cable at the point of crossing or on a parallel run is .....mm.
2. The minimum separation from a protected LV cable at the point of crossing or on a parallel run is .....mm.
3. The minimum separation from a protected HV cable at the point of crossing or on a parallel run is .....mm.
4. The minimum separation from a parallel running unprotected LV cable is .....mm.

10.6 Aerial cabling

10.6.1 Minimum installation heights

The following exercise will identify the minimum ground clearances necessary for the installation of aerial telecommunications cables.

Read Clause 5.5.4.1 of AS/ACIF S009:2001 this section details the minimum installation heights for aerial customer cabling.

Write your answers to the following questions.

1. What is the minimum height above the ground for aerial cables in a non-trafficable area of a customer premises?

   .....

2. What is the minimum height above the ground for an aerial cable crossing any commercial driveway or private roadway?

   .....

3. What is the minimum height above the ground for aerial customer cables over a public roadway or footpath?

   .....

10.6.2 Bearer fastenings

The termination of bearer wires must be such that, under adverse weather conditions, the termination provides adequate support to the installation. It is preferable to install a termination that tightens under increasing strain. **Clause 5.5.4.4 of AS/ACIF S009:2001** requires fastenings to walls or other supporting structures to be capable of supporting the load of the cable under the conditions of installation. When determining adequate support, the following factors require consideration:

- Length of span
- Wind velocity
- Ambient temperature
- Sag and
- Appropriate safety factors.

10.6.3 Crossings with power lines

Read Clause 5.5.4.5 of AS/ACIF S009:2001, this clause details the requirements for the installation of aerial cabling when crossing with power lines.

Complete the following statements.

1. It is **not** permissible for customer cabling containing electrically conductive elements to cross aerial power lines, where the power lines exceed .....kV.

2. Electrically conductive aerial customer cables may attach to structures carrying high voltage cables, provided that low voltage power lines are installed below the ..... power cables.

3. The telecommunications cable at the crossing shall incorporate an ....

4. Where telecommunications cables cross under HV lines in span, a minimum vertical separation of .....m **shall** be maintained at the crossing between the telecommunications cables and the HV lines.

5. Aerial customer cables are required to cross ..... aerial power lines except in unusual circumstances, whereupon conditions apply.

6. If the aerial telephone cable must be uppermost then its height and span must be such that in the event of failure at either end it will clear the power cable by at least ..... m. The power utility must also be in agreement.

10.6.4 Cabling across watercourses

Aerial cabling over waterways shall comply with the .....of the relevant .....

10.6.5 Shared poles

Read Clause 5.5.4.6 of AS/ACIF S009:2001, this clause details the requirements for the installation of aerial customer cabling on shared poles

Complete the following:

1. What is the requirement for aerial customer cabling having an integral bearer wire?

   .....

   .....

2. Aerial customer cabling shall not be installed ..... power cables.

3. The cables of what other service can be present on a shared pole, where an engineered solution has been devised and the telecommunications cables are electrically conductive?

   Answer: Those of .....

4. What is the minimum separation specified for aerial customer cabling, when sharing a pole with LV aerial services under the following conditions?

   - The LV aerial service has insulated conductors and the separation is measured at a pole?

     ..... mm.

   - The separation is measured mid-span between cables? ..... mm.

   - The LV aerial services are un-insulated and the separation is measured at a pole?

     ..... mm.

5. What is the minimum separation between customer cabling joint terminations or enclosures, and un-insulated LV aerial lines at a pole? ..... mm.

6. What is the minimum separation between aerial termination enclosures and conduits, light fitting and stays?

   .....

7. What is the requirement for power earth cables on a shared pole?

   .....

   .....

   .....

Separation of cables of different services mid-span on a cable route is a mechanical separation to prevent cables tangling or chaffing when power cables sag due to heat or are blown around by turbulent wind. Separation of services at poles and the requirement for any earth conductors to be insulated is for the safety of cablers when required to work on the poles.

Mark the minimum dimensions of W, X, Y & Z on the following diagram.

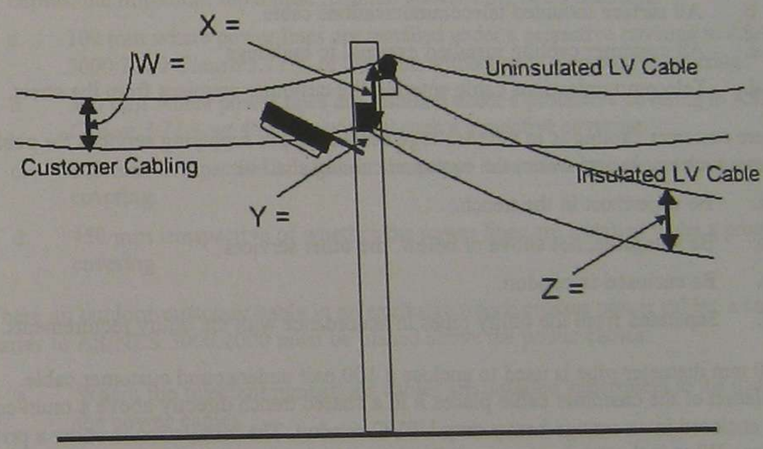


Figure 8

- W =
- Z =
- Y =
- X =

10.7 Self Help Questions

1. In AS/ACIF Technical Standards, outdoor cable is:
   a. All cabling that is external to buildings.
   b. All surface mounted telecommunications cable.
   c. All customer cabling installed external to buildings
   d. Telecommunications cable entering the customer premises from the street.

2. Where customer cabling is in a trench together with pipes supplying services for public utilities such as gas and water, the customer cabling shall be:
   a. Be uppermost in the trench.
   b. Be alongside, not above or below, the other services
   c. Be enclosed in conduit.
   d. Separated from the utility pipes in accordance with the utility requirements.

3. A 100 mm diameter pipe is used to enclose a 100 pair underground customer cable. Installation of the customer cable places it in a shared trench directly above a multi-core HV cable enclosed in an orange heavy duty UPVC conduit. The installation is under a private roadway. What is the minimum trench depth required above the HV conduit for the installation to comply with AS/ACIF S009:2001?
   a. 800 mm
   b. 700 mm
   c. 900 mm
   d. 950 mm

4. When can cable designed for indoor use, be used on the outside of a building?
   a. Only if the insulation is of polyethylene or equivalent.
   b. When the cable is installed in a position that is not exposed to direct sunlight, or it is otherwise protected against exposure.
   c. When the cable is installed in a position that is not exposed to rainfall, or it is otherwise protected against moisture.
   d. Only when it is installed on the sheltered side of the building.

5. Where customer cabling is in a trench together with LV power cables and neither cables are installed in conduit, then separation must be such that:
   a. The telecommunications cables are above the electrical cables.
   b. The cables are side-by-side.
   c. The telecommunications cables are below the electrical cables.
   d. Each service can be accessed without disturbing the other.

6. Where an outdoor customer cable installed in an exclusive trench runs parallel with existing LV cables, the minimum separation required between the two systems is:
   a. 100 mm where power lines are installed under a protective covering to AS/NZS 3000:2000 *Clause 3.11.4*, or 300 mm without such a protective covering.
   b. 300 mm where power lines are installed under a protective covering to AS3000 *Clause 3.11.4*, or 450 mm without such a protective covering.
   c. 300 mm irrespective of whether the power lines are installed under a protective covering.
   d. 450 mm irrespective of whether the power lines are installed under a protective covering.

7. Where an outdoor customer cable in an exclusive trench crosses power cables, a concrete barrier to AS/NZS 3000:2000 must be placed above the power cables:
   a. Where the telecommunications cables are installed subsequent to the installation of the power cables.
   b. For 600 mm either side of the crossing where the power cables will be uppermost and are not enclosed in heavy duty UPVC orange conduit.
   c. For 300 mm either side of the crossing where the power cables are not enclosed in heavy duty PVC conduit.
   d. Where the power cables share a common trench with water or gas services.

8. Where customer cabling is in a trench together with LV power cables and both systems are in conduits, the minimum separation between the conduits is:
   a. Nil, provided that heavy duty PVC conduit is used for both telecommunications and electrical power cables.
   b. Nil, provided that both conduits are identified by the colours, white for telecommunications cables and orange for electrical power cables.
   c. 50 mm, provided that the telecommunications cables are installed above the electrical power cables.
   d. 100 mm.

9. What is the minimum separation required where telephone cables cross HV power cables in an exclusive trench?

   a. Where telephone cables cross other services the utility concerned determines the separations. However where telephone cables cross HV power cables the separation must be a minimum of 300 mm where the HV cable is in or under a protective covering to AS/NZS 3000:2000 or 450 mm without such covering.

   b. Where telephone cables cross other services the utility concerned determines the separations. However where telephone cables cross HV power cables the separation must be a minimum of 100 mm where the HV cable is in or under a protective covering to AS/NZS 3000:2000 or 300 mm without such covering.

   c. Where telephone cables cross other services the utility concerned determines the separations. However where telephone cables cross HV power cables the separation must be a minimum of 300 mm where the HV cable is **not** in or under a protective covering to AS 3000 and a protective barrier extending at least 600 mm in all directions installed above the crossing in accordance with AS 3000. The separation must be a minimum of 100 mm where the HV cable is in or under a protective covering to AS/NZS 3000:2000.

   d. Where telephone cables cross other services the utility concerned determines the separations. However where telephone cables cross HV power cables the separation must be a minimum of 300 mm where the HV cable is **not** in or under a protective covering to AS/NZS 3000:2000. The separation must be a minimum of 100 mm where the HV cable is in or under a protective covering to AS/NZS 3000:2000. Where the power must be uppermost it is necessary to install a protective barrier above the crossing. The barrier must extend at least 600 mm in all directions in accordance with AS/NZS 3000:2000.

10. The minimum height of aerial cables above the ground in a non-trafficable area on private property is:

    a. 2.7 m

    b. 3.5 m

    c. 3.7 m

    d. 4.9 m

11. The minimum height of aerial cables above ground over a residential driveway is:

    a. 2.7 m

    b. 3.5 m

    c. 3.7 m

    d. 4.9 m

12. The minimum height of aerial telecommunications cable above ground over commercial driveways:

    a. 2.7 m

    b. 3.5 m

    c. 3.9 m

    d. 4.9 m

13. The minimum separation between aerial cables and uninsulated LV power main conductors in-span is:

    a. 450 mm

    b. 600 mm

    c. 1.2 m

    d. 1.8 m

14. The minimum separation between aerial cables and an insulated, service lead or main power conductor is:

    a. 450 mm

    b. 600 mm

    c. 1.2 m

    d. 1.8 m

15. What separation is required between an aerial telecommunications cable and light fittings, conduits and stays?

    a. 50 mm

    b. 100 mm

    c. 300 mm

    d. 600 mm

16. Telecommunications cable installed as aerial cabling at a crossing of power lines, or on a shared pole route, shall:

    a. Have an earthed integral bearer (IB).

    b. Be affixed to separate bearer cable

    c. Have a polyethylene sheath

    d. Have an IB that is insulated from earth.

Section 11 Earthing

11.1 Introduction

Purpose

To develop knowledge of the regulatory requirements associated with telecommunications earthing systems installation, and the equipotential bonding methods for such systems.

Objectives

At the end of this section successful participants will be able to:

- Describe the basics of the three telecommunications earthing systems available for use.
- Identify the component parts of each system.
- Explain the regulatory requirements for equipotential bonding to the protective earth system.
- Explain the function of the telecommunications functional earth electrode
- State the earth reference for connecting cable shields and metallic components of a customer cabling installation to if and when required.
- Detail the earthing requirements for surge suppression devices

Resources

The following resources are required to complete this section:

- Communications Cabling Manual
- NTE005 Learner Resource

11.2 Important terminology

Communications Earth System (CES)

A system of earthing using common elements to provide earthing facilities for electrical and communications equipment within a premises, including protective and functional earthing for telecommunications purposes. Cables used for this system have green/yellow coloured insulation.

Communications Earth Terminal (CET)

A terminal provided for the purpose of equipotential bonding of the TRC or the CES to the main earthing bar, main earthing conductor or sub-main earthing conductor of the protective earthing system. (The Communications Earth Terminal was formerly known as the Bonding Terminal.)

Differential Earth Clamp

A device that electrically connects two earthing systems under overvoltage conditions, but remains electrically disconnected under normal operating conditions.

Protective Earthing Conductor

A protective earthing conductor is a conductor, other than a main earthing conductor, connecting any portion of the electrical earthing system to the portion of the electrical installation or electrical equipment required to be earthed, or to any other portion of the electrical system (refer AS/NZS 3000[11]).

Telecommunications Reference Conductor (TRC)

A low noise earth system providing a zero voltage reference point for telecommunications signalling and other functional purposes, which may include equipment reliability. Cables used for this system have violet coloured insulation.

Telecommunications Functional Earth Electrode (TFEE)

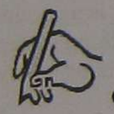
A connection to the general mass of earth so as to provide a functional requirement for the telecommunications equipment and cabling. (There is not a requirement to install a TFEE, except where a TRC is indirectly bonded to the building protective earth or to reduce the amount of d.c. current flowing to earth via the protective earth electrode.)

Summary

Three systems are available for telecommunications earthing requirements in customer premises. The choice of system for a particular requirement is dependant on a number of issues, including cost, whether a system is already installed, and if so whether it is electrically "noisy" thus subjecting equipment to unreliable performance.

- The choice of a **TRC** as a low noise earth reference that can be further enhanced by the use of an indirect bond to the building protective earth, or
- The use of the CES, which can be cost effective due to its access to the building protective earth in the local vicinity of the earth needed and its dual use for functional and protective use, allows a choice of systems to be made dependant on the site requirements and whether it is required at all.
- The **ELV d.c. power supply system** is for particular applications where large customer equipment installations use a distributed battery feed that utilises the return current path as the earthing conductor for equipment. This cannot comply with the requirements of a TRC or CES but if installed to AS 3015 (the standard for this type of equipment) then it will meets the intent of AS/ACIF S009:2001.

Read Clause 5.6.1of AS/ACIF S009:2001.



Complete the following:

1. A TRC is a low noise telecommunications earthing system used for both

   ..... and other ..... purposes.

2. What types of colour cables are suitable for the TRC system?

   .....

3. What types of colour cables are suitable for the CES system?

   .....

11.3 General requirements for CES and TRC

Read Clause 5.6.2 of AS/ACIF S009:2001.

Complete the following:

1. Interconnection between a TRC and a CES shall be kept ..... and

   distinct except where the TRC is ..... bonded to the

   main earthing conductor.

The TRC or CES may be used where an earth reference is required for functional purposes of customer equipment. (Clause 5.6.2.2)

Lists specifying whether a functional earth reference is required for some equipment is no longer included as part of the CCM. Installers should check the installation instructions or the manufacturer of the equipment to determine the earthing requirements.

2. Multi-pair cable.....be used for TRC or CES distribution except for

   individual connection of a CES or TRC to ..... in

   conjunction with a .....line.

Requirements for earth bars and terminals and cable termination.

Read clause 5.6.2.5 &5.6.2.6 of AS/ACIF S009:2001

Complete the following:

- All earth bars must be capable of accepting a .....mm^2 conductor.
- Consolidation of bare strands before termination ..... be made by means of

  .....
- All conductors strands of a cable .....secured
- The bare strands.....twisted or otherwise consolidated before termination

Cable joints and couplings

Read clause 5.6.2.7 of AS/ACIF S009:2001

Complete the following:

1. Joints or couplings in earth cables **shall** be .....and .....sound to reliably maintain electrical continuity. This may be achieved by any of the following methods:

   (a) .....

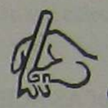
   (b) .....

2. Tunnel type connectors shall provide at least ..... screws per termination.

11.4 Equipotential bonding

Equipotential bonding minimises the risk associated with the voltage differences between the accessible live parts of electrical equipment and accessible metallic parts **not** associated with the electrical installation.

Read clause 5.6.2.8 of AS/ACIF S009:2001



Complete the following:

The TRC or CES requires bonding to the protective earth. The bonding of a TRC must be at one point only within the building containing the TRC.

1. The bonding conductor must be a multi-stranded copper conductor having .... coloured insulation.

2. A CET shall be installed in a ..... and .... position, and not within an ..... switchboard.

3. The size of the bonding conductor shall have a minimum cross sectional area of.....

4. The length of the bonding conductor should be as ..... and ..... as practicable.

5. The bonding conductor must be ..... at both ends where either cannot be easily identified.

6. A cabling provider may make connection to the main or submain ..... conductor or ..... of the installation for the purposes of equipotential bonding.

7. Only licensed ..... can cut and rearrange the main earthing conductor and a licensed cabler cannot make any connection within the .....

8. A cabling provider must **not** do anything to alter the integrity of the ..... system.

11.5 Communications earth system (CES)

The CES allows for equipotential bonding from a CET to various locations on the protective earth system in the vicinity of the earthing requirement. Access points are detailed in **Figs 1 & 2 of AS/ACIF S009:2001.** This provides for a minimal cost access to an earth for protective or functional purposes.

Read Clause 5.6.3 of AS/ACIF S009:2001.

Answer the following.

1. Resistance of the CES measured between the point of connection to the earthing system of the electrical installation and the earth bar or terminal at any NTDE, distributor or CSS shall not exceed .....

A block diagram of a typical CES is shown in Fig 4-10 Module 2 HB 29:2000 of the CCM.

Examine **Fig 1 & 2 of AS/ACIF S009:2001** and list the names of the points on the protective earth system to which a cable from a CET may be connected. Endorse your answer "by an electrician" where applicable.

.....

.....

.....

.....

.....

.....

Bonding the CES to the protective earthing conductor

The CES may be bonded to the protective earthing conductor by the following methods:

- From a sub-main earthing conductor to a CET,
- From an electrical distribution switchboard to a CET.

Refer to AS/ACIF S009:2001 Figures 1 & 2 for a diagram of earth connections.

11.6 Telecommunications reference conductor

Read Clause 5.6.4 of AS/ACIF S009:2001, this clause details the particular requirements applicable to the installation of a TRC. Minimum cable sizes and colours are indicated in Table 4 of AS/ACIF S009.

Complete the following:

Exclusive to telecommunications systems

1. Where provided, the TRC system **shall** be ....., separate and distinct from protective earth or any other building earth systems, apart from a single ..... connection to the main earthing system.

Cabling Method

2. A TRC system shall emanate from a ..... distributor and be cabled in a ..... configuration.

TRC link bars

2. How can the required insulation value of 1.5 kV between a earth bar and any metal or earth be achieved?

.....

.....

.....

Diagrams of a TRC are shown in Fig. 3 of AS/ACIF S009:2001 and also in Fig. 4-9, Module 2 HB 29:2000 of the CCM.

Equipotential bonding of TRC Clause 5.6.4.8

1. A TRC shall be equipotentially bonded to the earthing system of the electrical installation at

   .... only .

2. When the TRC is equipotentially bonded with a differential earth clamp:

   - A .....shall be provided
   - All TRC link bars and terminations shall be ..... or

     .....to prevent customer access

   - Where the maximum limiting voltage of the differential earth clamp exceeds ELV all

     TRC link bars.....be suitably .....

AS/ACIF S009:2001 Fig 4 details in diagrammatic form, the installation of differential earth clamps.

Bonding the TRC to the protective earthing conductor

Essentially there are three alternatives available for bonding of the TRC, these are:

- From the nominated distributor link bar to the main earthing bar (within an electrical switchboard) via a CET. Only a licensed electrician can make the connection to the electrical switchboard.
- From the nominated distributor link bar to the main earthing conductor via a CET.
- From the nominated distributor link bar direct to the electrical earth electrode. AS/NZS 3000:2000 Clause 5.8.2.6 precludes the use of an enclosed terminal (CET) for direct connection to the earth electrode.

Refer to AS/ACIF S009:2001 Figures 3 & 4 for a diagram of earth connections.

TRC in a separate building Clause 5.6.4.9

1. Where a TRC is required in a separate building on customer's premises, and the building has its own electrical switchboard:

   - The TRC .....be connected to the main building TRC

Clause 4.6 Module 2 HB 29:2000 of the CCM details the earthing arrangements for a TRC in a separate building.

Resistance of the TRC system Clause 5.6.4.10

1. What is the maximum resistance between the TRC earth bar at the nominated distributor and that of any distributor or CSS?.....

Fig 4-11 of Module 2 HB 29:2000 of the CCM details in diagram form the resistance limits of a TRC, and follows on by detailing a method on how to measure the resistances of a TRC and a CES.

Telecommunications functional earth electrode (TFEE) Clause 5.6.4.7

It is **not** essential to provide a Telecommunications Functional Earth Electrode, (TFEE) unless a differential earth clamp is fitted in line with the communications bonding conductor, in this case the TFEE will be the only earth reference normally found on a TRC installed in this configuration (see Fig. 4 of AS/ACIF S009:2001 for connection of differential earth clamp). A TFEE may be used for operational purposes or to limit the direct current flowing in the communications bonding conductor. When installed, a TFEE must comply with the requirements of AS/NZS 3000:2000 Clauses 5.6.2.1, 5.6.2.2 and 5.6.2.3. These clauses describe the type and size of suitable materials as well as the method for installing earth electrodes.

1. Where used the TFEE must comply with the relevant clauses of AS/NZS 3000:2000 or:

   .....

   .....

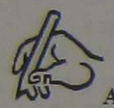
   .....

2. The TFEE is also required to be permanently labelled "....."

11.7 D.C. earth return circuits

Some old mechanical teleprinters (that are retained by financial institutions and booking agents) use an earth as a third wire signal earth. The d.c. current flow to ground exceeds normal limits and erodes the earth electrode, hence the restriction on bonding to the protective earthing system of a building.

Read Clause 5.6.6 of AS/ACIF S009:2001, this clause details the requirements for DC earth return circuits.



Answer the following;

1. Where customer equipment requires a functional earth for DC earth return circuits, the earth connections **shall** be ..... from the TRC and CES systems, and earthing system of the electrical installation and ..... be directly connected to any other earth system building metalwork.

2. However, the telex earth may be indirectly connected to the main earthing conductor, TRC system or a CES via a .....

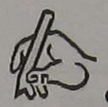
3. Cables used for the extension of the dedicated telecommunications functional earth electrode to the distributor or customer equipment **shall** have ..... PVC insulation and **shall** be legibly identified '....." at each termination point of the cable.

11.8 Earthing Of Cable Shields And Drain Wires

Read Clause 5.6.7 of AS/ACIF S009:2001.

Cable shields are for signal protection from external influences. This is of a protective nature not a functional one associated with the operation of equipment. Hence shields and drain wires **shall not be connected to the TRC** except where the TRC is equipotentially bonded to the main earthing bar, conductor or electrode.

The cable shield may be connected to any point on the CES.



Complete the following:

1. Where shielded cable is installed between buildings with separate protective earth systems ..... or ..... ends of the shielded cable shall be ..... from any metallic connection or .....reference.

11.9 Earthing Of Metallic Frames, Backmounts, Enclosures, Trays, Conduits And Ducts

Read clause 5.6.8 of AS/ACIF S009:2001

Metallic components of cable support or enclosure components **are not required to be earthed**, other than where specified in relation to separation arrangements between cables or terminations or manufacturers requirements.

Complete the following:

1. When these are connected to an earth reference it will not be connected to the ..... and will use a minimum .....mm^2 ..... insulated conductor.

11.10 Earthing of surge suppression devices

Read Clause 5.6.9 of AS/ACIF S009:2001.

Answer the following:

1. The colour and minimum conductor size specified for connection of surge suppression devices to an earth reference in customer cabling is:

   .... mm^2 .

2. The two earth references specified to connect the surge suppression devices to are:

   a. .....

   b. .....

Note that the cable from the surge suppression device to the protective earth connection should not exceed 10 metres in length. This is from known data, that surge suppressors are less effective if longer cable lengths are used.

A method of reducing the length of cable is to install a protective earth electrode (if possible) closer to the surge suppression devices, and then bond this electrode to the building earth electrode.

Activity

From **Table 4 and Figs.1, 2, 3 & 4 of AS/ACIF S009:2001**, compete the following diagram, adding colours and references to minimum sizes of conductors used to:

- Equipotentially bond to the protective earthing conductor.
- Run the TRC from the nominated distributor to the other distributors,
- Connect a CES to distributors (Shown as —·—·—·—)
- Run a cable to a CET from an electrical distribution board and to a distributor.
- Run a cable to a metal barrier from the CET provided above

If you have the correct coloured marking devices, then use those,

- Using green for green yellow, and Blue if necessary for any violet insulated conductors.

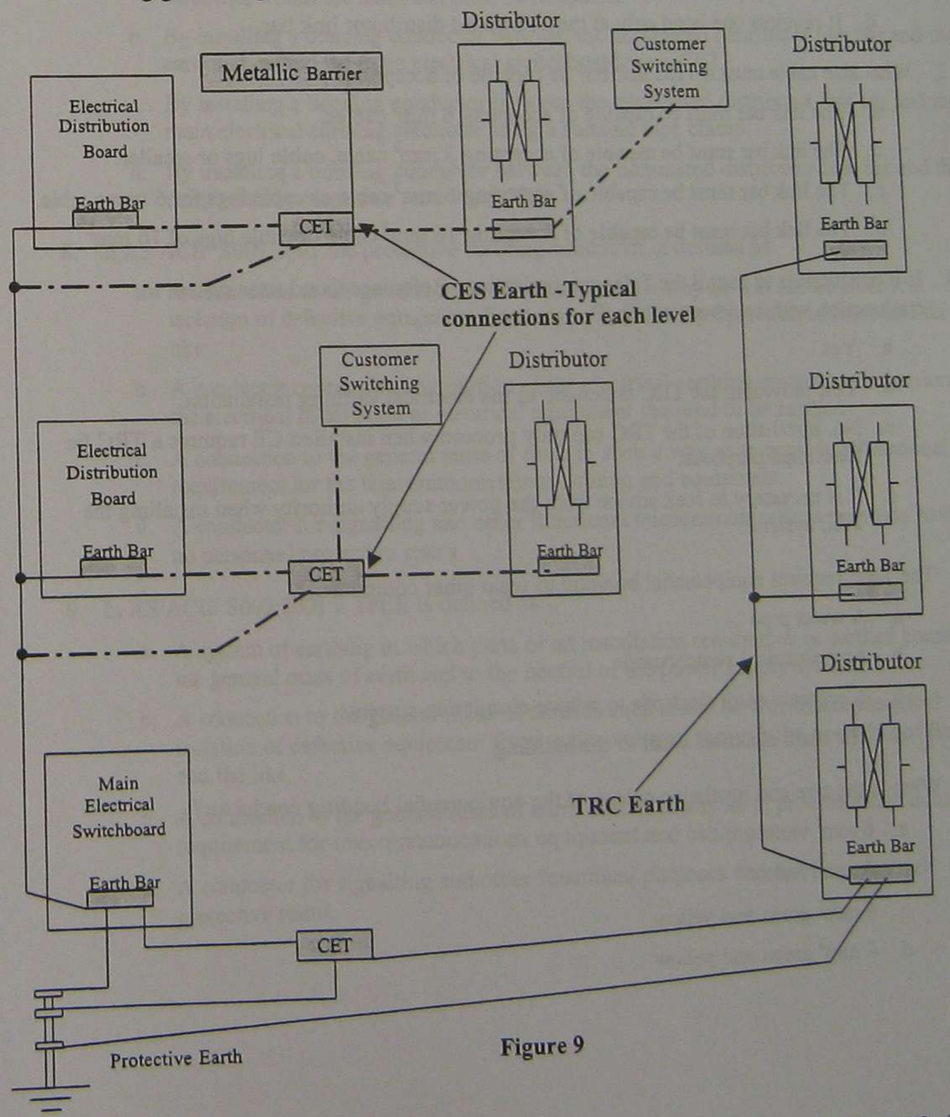


Figure 9

11.11 Self help questions

1. At how many points on the TRC should equipotential bonds be made?
   a. A minimum of 3 points where one is from the nominated distributor link bar.
   b. Up to a maximum of 3 as provided one is at the nominated distributor link bar.
   c. As many bonds as is necessary to provide the necessary current capacity.
   d. It requires one bond only at the nominated distributor link bar.

2. What size cable must a TRC link bar be capable of accepting?
   a. The link bar must be capable of accepting 6 mm^2 cables.
   b. The link bar must be capable of accepting 3 mm^2 cable, cable lugs or smaller.
   c. The link bar must be capable of accepting 6 mm^2 cable or cable lugs for 6 mm 2 cable.
   d. The link bar must be capable of accepting 16 mm^2 cable or cable lugs of 16 mm^2

3. Is it permissible to install the Telecommunications Reference Conductor system in conjunction with backbone cabling?
   a. Yes.
   b. Yes, providing the TRC is bonded to the electrical earthing installation.
   c. No, installation of the TRC can only proceed when installed CE requires a TRC for functional purposes.
   d. It is necessary to seek advice from the power supply authority when installing the TRC system.

4. The TRC requires equipotential bonding to what other component?
   a. A water pipe
   b. Any electrical switchboard
   c. A separate earth electrode to reduce circulating currents
   d. The main electrical earth of the building

5. What is the size and insulation colour of the equipotential bonding conductor?
   a. 6 mm^2 violet
   b. 4 mm^2 violet
   c. 6 mm^2 green and yellow
   d. 4 mm^2 green and yellow

6. What is the colour and minimum conductor size for a TRC, connecting any distributor link bar and the nominated distributor link bar?
   a. 2.5 mm^2 violet
   b. 2.5 mm^2 green and yellow
   c. 4 mm^2 violet
   d. 4 mm^2 green and yellow

7. It is a requirement to bond the TRC cable to the electrical installation earthing system of the building. What is not a suitable method of complying with this requirement?
   a. By installing a bonding conductor between the nominated distributor link bar and the earth link within the main electrical switchboard.
   b. By installing a bonding conductor between the nominated distributor link bar and the earth link within the main electrical switchboard via a CET.
   c. By installing a bonding conductor between the nominated distributor link bar and the main electrical earthing electrode using a suitable pipe clamp.
   d. By installing a bonding conductor between the nominated distributor link bar and the main earthing conductor wire via a CET.

8. In AS/ACIF S009:2001 the protective earthing conductor is defined as:
   a. A connection to the general mass of earth in such a way as will ensure electrical isolation of defective equipment from mains voltages by operation of fuses and the like.
   b. A conductor connecting any portion of the electrical earthing system to the portion of the electrical installation or electrical equipment required to be earthed.
   c. A connection to the general mass of earth in such a way as to provide a functional requirement for the telecommunications cabling and equipment.
   d. A conductor for signalling and other functional telecommunications purposes having no personnel protective status.

9. In AS/ACIF S009:2001 a TFEE is defined as:
   a. A system of earthing in which parts of an installation required to be earthed connect to the general mass of earth and to the neutral of the power supply system.
   b. A connection to the general mass of earth in such a way as will ensure electrical isolation of defective equipment from mains voltages through the operation of fuses and the like.
   c. A connection to the general mass of earth in such a way as to provide a functional requirement for telecommunications equipment and cabling.
   d. A conductor for signalling and other functional purposes and has no personnel protective status.

10. What is the colour and minimum conductor size for a CES, connecting any distributor link bar and the CET?

    a. 2.5 mm^2 violet

    b. 2.5 mm^2 green and yellow

    c. 4 mm^2 violet

    d. 6 mm^2 green and yellow

Section 12 Appendices Summary

12.1 Appendix A

Provides information on the limit to current flowing in the bond to the protective earth. Electrolysis from direct current flowing to earth erodes electrodes and is a safety issue when it concerns the building protective earth.

12.2 Appendix B

This is an informative appendix that has material in it that if complied with, satisfies the requirements of accessibility relating to the installation of network boundary distributors.

Assessment of the following sections will be by the completion of the activities.

These activities are required to be submitted to the course facilitator for assessment on the sheets provided with this workbook.

Contact your facilitator if you have any questions or you have not received the Activity sheets

Section 13 Fire regulations and heritage buildings

13.1 Introduction

Purpose
The purpose of this section is to develop your awareness of the special requirements for cabling in heritage buildings and buildings of high fire risk.

Objectives

At the end of this section you will be able to:

- State the fire regulatory requirements for cabling in buildings
- Define what is meant by the term heritage
- Describe the requirements for cabling in heritage buildings

Assessment Criteria
The assessment for this section will be in the form of completing **Activity 1**.

Resources

The following resources are required to complete this section:

- Communications Cabling Manual.
- Building Code of Australia (or selected extracts)
- AS 3084: 1993

13.2 Overview

When cabling in existing buildings, the cabler is often required to conceal wiring wherever possible. This may involve running cables under floors, using false ceilings in roofs, riser shafts or in duct or conduit. Concealing cables is of particular importance when it comes to cabling in buildings considered to be of historical significance. In Australia, laws have been set in place to protect the integrity of such buildings, monuments, sacred sights etc. and to preserve their character. It is important for the cabler to familiarise themselves with these requirements and any other requirements for cabling such as fire regulations. In this section you will study some of these requirements that by law, a cabler must conform to.

13.3 What is Heritage?

The term Heritage may be broadly defined as 'the possessions, traditions or conditions that have been passed from one generation to another'. In Australia there are many towns, buildings, places and relics that are considered to be a part of Australia's heritage. These sites are historically significant and considered worthy of preservation for future generations. They may be of cultural, architectural or archaeological significance and as such are part of our heritage.

Legislation has been passed in this country to protect such heritage sites for both future generations and to ensure coexistence with current occupants. This means that cabling in heritage buildings may require special considerations to be taken into account before undertaking any work in order to preserve the existing structure and character of the building.

Before examining these requirements, it is useful to have a general overview of the heritage laws and the government departments involved.

NOTE: This also includes Aboriginal sacred sites and running underground cables as well as cabling in buildings.

13.4 Heritage Laws and Government Departments Involved

13.4.1 The Australian Heritage Commission

The Australian Heritage Commission is a federal body with the main purpose of compiling a register of heritage sites. This national inventory may be used by other government bodies or other interested parties in determining the significance of a particular site. Once the significance of a site is determined, steps may then be taken to ensure adequate protection of that site. This may also include world heritage listing.

View the information available at the Australian Heritage Commission Internet site:

www.ahc.gov.au

13.4.2 State Heritage listings

State governments each have their own heritage act that deals with the heritage sites in that state. It is at this level that conservation orders may be placed on sites. These conservation orders may prohibit a range of activities on the site and work may not commence without the approval of the relevant authority.

13.4.3 Local Government Heritage listings

Local government bodies may list heritage items through planning instruments. For example, a local government may re zone an area considered to be historically significant so that all existing buildings remain and are preserved in their original condition.

Contact your Local Council and find out what information they have on Heritage listings.

13.5 Cabling in Heritage buildings

As mentioned earlier, many old, historic or buildings of significant interest may be listed under the heritage act. In other words a conservation order may apply to that site and permission may be required before commencing any work. The area of most concern to the cabler is the concealing of wiring within the building.

All equipment, for example distributors should be placed in locations, which makes them unobtrusive and aesthetically compatible with the building. In many situations existing finishes are to remain intact. It is essential that the wiring methods used to conceal wiring and the methods employed to carry out the installation, cause little or no harm to the existing structures and finishes.

Wherever possible, cabling should be run in the roof or under floor spaces and in cavities. Due to the nature of many old buildings finding a wall cavity may be difficult (many old buildings have solid walls). In these cases it may be necessary to go to extreme lengths to conceal wiring. For example skirting boards may have to be removed, walls behind these boards chased and cable run in duct or conduit behind the skirting. Another alternate might be to run the cable in the garden bed and only bring the cable (below ground height) into the building at the desired location. If you have to run cable from floor to ceiling, it may be necessary to do this within a cupboard or an especially made-up boxed section using a style and colour to match the existing finish. Remember that there are many Builders and Artisans who specialise in this type of work.

Customer Equipment should be installed in locations where the items will not affect the aesthetics of the building. This may be achieved by locating the equipment in dedicated rooms, under stairs or in cupboards. If minimum clearances cannot be met (refer to AS/ACIF S009:2001) try ringing the cabling section of the ACA and asking them for special dispensation (after explaining the circumstances).

Any cabling work performed in a heritage-listed building is usually specialised work and should only proceed on the advice of a specialist in the area, such as an architect or builder. In some cases the person asking you to carry out the work, the heritage commission or the local council can direct you to people with in depth knowledge of that particular building or may have detailed plans of the building. The cabler may also need to obtain permits from the relevant authorities, particularly if you are the only contractor on site.

13.6 Fire regulations and cabling

When installing cables in any building one of the most important aspects of the building code is fire prevention and safety. It is vital that cabler's be aware of how the installation may affect the fire safety of the building.

There are two main ways that a cable installation may affect the fire safety of a building.

- Materials used may be combustible and provide fuel for fire
- Materials may produce toxic fumes.

The Communications Cabling Manual (CCM) details the requirements for cable and cabling products used in an installation. AS/ACIF S008:2001 specifies that:

- Conduit/pipe manufactured to AS/NZS 2053 shall comply with clause 5 of AS/NZS 2053. (Clause 5.6 covers flame propagation).
- Network boundary distributors of less than 10 pair's capacity shall be non-flame propagating - in accordance with AS/NZS 2053.2.
- Fire resistance Devices of insulative material shall pass the glow wire test of AS/NZS 4695.2.13 at 850 °C.
- Cable, cordage and cords for indoor use shall pass the combustion propagation test of clause 3.8, Table 3.3 of AS 3191.

The purpose of these standards is to ensure that materials used in a cable installation will not promote a fire and will produce minimal toxic fumes if a fire occurs. The way the cables are run or where cabling products are mounted may also affect the safety of a building.

Mounting distributors in fire exits and fire hose cabinets is not allowed.

The penetration of fire rated walls, floors and ceilings may dramatically affect the fire safety of a building. The Building Code of Australia covers regulatory requirements other than those of S009 & S008. It details the requirements of fire stopping penetrations etc. when a cabler is required to penetrate firewalls, floors etc.

13.7 Self help questions

1. Define in your own words what is meant by the term "heritage".

---

2. Why is it necessary to protect heritage sites?

---

3. What precautions would you take when working on an old building that may be heritage listed?

---

4. What is the purpose of fire regulations in terms of building structures?

---

5. Which document sets out the minimum requirements for fire safety in buildings?

NOTE: Assessment for this section will be by completing **Activity 1**.

Complete Activity 1 now.

Section 14 Cabling in external locations

14.1 Introduction

Purpose

The purpose of this section is to develop your understanding of the requirements for cabling on private and public property.

Objectives

At the end of this section you will be able to:

- Outline access and reinstatement requirements of privately owned property
- Outline the dial before you dig requirements
- Describe the joint use agreements in place between utility providers and cablers
- Describe the role of local councils in cabling
- Identify local traffic control regulations and procedures

Assessment criteria

The assessment for this section will be in the form of completing the **Activity 2**.

Resources

The following resource is required to complete this section:

- Communications Cabling Manual (CCM).
- Local Council information.

14.2 Overview

Telecommunications cablers are often required to run external cables on private property or in some cases across public roads and places. When this is done it is essential that the site is left in the same or better condition than originally found. This section addresses the requirements for cabling in such areas and examines some common codes of practice as well as local regulations that need to be adhered to.

14.3 Access and cabling on private property

14.3.1 Reinstatement requirements

Whenever cabling work is performed on private property, it is regarded as 'best practice' to leave the job site in an 'as found' condition. This is of particular importance when it comes to cabling in external locations, but still applies to cabling in and on buildings.

When cabling in or on a building, it is essential to replace any building components that are removed for cabling purposes and to repair and make good any damage to paint work or surfaces. This is of particular importance where penetrations in buildings occur.

It is vital that any penetrations into buildings are made both **water** and **vermin resistant** to prevent any future problems.

In external locations, particularly where cable trenching is involved, leaving the area as found may be more difficult. When digging trenches the topsoil should always be put to one side and always put back into the trench last. If the trench crosses a lawn area, the grass should be removed in strips and replaced accordingly. If this can't be done the area should be re-seeded with grass that closely matches the existing lawn. In garden areas plants should be carefully removed and set aside ready for re-planting. The route for the trench should be carefully considered to avoid large trees and bushes.

Remember if you damage or remove tree roots this may weaken the tree and cause it to fall during a storm or high winds.

One major problem that occurs as a result of trenching is sinking of backfilled areas, leaving the trench lower than the surrounding ground level. This problem results from the trench being backfilled and finished to existing ground level without compacting the material. After a period of time, or heavy rain, the trench sinks leaving a depression.

There are two simple ways of overcoming this problem:

1. Compacting of backfill material, using a compactor.
2. Finishing the trench above ground level, to allow for sinking.

If a compactor is used to compress backfill during the filling in stage, then there is no need to allow for future compaction. Using this method, trenches are filled in stages (150 to 300mm) and compacted at each stage. The trench is then finished to existing ground level. This method is recommended wherever a trench crosses a roadway or vehicular path.

If trenches are not compacted during the backfill stage then it is essential to overfill the trench, leaving a small mound to compact with time. This is not a preferred method, but may be used in areas where appearance is not important, such as in garden beds.

It is also important that when trenching or digging to be mindful of other services buried in the ground. These include services such as electricity, gas, water and even other telecommunications cables. Coming into contact with these services could be hazardous to you or others, very costly to restore or fix, or cause inconvenience to others during the down time.

14.3.2 Location of Existing Services

Before any trenching or digging is commenced on private property it is a good idea to determine the exact location of all existing services prior to excavation.

There are several ways to determine the existing locations of services prior to digging.

- The simplest way is to look for pits or manholes pertaining to a particular service, or electrical conduits entering buildings.
- Look for the current location of existing switchboards, gas meters etc.
- Are the services run to the property in aerial cable?
- Are there storm water pipes running into gutters outside the property boundary?

All these give vital clues as to the location of pipes and conduits running to existing services.

14.3.3 Dial before you dig

'Dial before you Dig' is another solution to this problem in public areas. It simply involves dialing 1100 and providing information on the location of the proposed installation. They will provide you with the information on location of services that subscribe to the 1100 "Dial before you Dig" service. Information on private installations by contractors or utilities not subscribing to the 1100 service will not be recorded. Be aware that this service may not cover all installations in the proposed work area.

14.4 Cabling on public property

14.4.1 Line Links between Premises

Formally known as the 500 Metre Rule, the Telecommunications Act 1997 provides for persons other than carriers to own line links (cables) between premises. Austel/ACA licensed/registered cablers may provide these where the requirements of *'the Act'* are met.

This means that a licensed cabler could be required to run either underground or aerial cable on public land (provided certain conditions are met). Refer to the CCM, (Module 1, HB243:2000 Australian Regulatory Arrangements, Section 4 page 13 and AS/ACIF S009:2001 clause 5.5.1.5), for further information and details.

Complete the following activity – **Line Link Regulations**

1. Using your Communications Cabling Manual, Module 1, HB243:2000 Australian Regulatory Arrangements, Section 4, summarise in the space below the requirements for a single cable installation where the one owner wants to cable between two distinct places. The link will be available to multiple parties for the switching of telephone calls.

---

2. Using your Communications Cabling Manual, Module 1, HB243:2000 Australian Regulatory Arrangements, Section 4, summarise in the space below the requirements for a **Multiple** Line Link installation where a single owner wants to cable between two or more places. The link will be available to multiple parties for the switching of telephone calls between them.

---

3. Using your CCM, summarise in the space below any requirements concerning local government and ACA's Line Link rules. (Refer to AS/ACIF S009:2001, clause 5.5.1.5 and Module 1 HB243:2000, Australian Regulatory Arrangements, Section 4).

When cabling on public property, similar reinstatement requirements apply as to cabling on private property. The main difference with cabling on public property when compared to private land is access requirements. The licensed cabler must obtain approval from all relevant authorities before doing any cabling work on public land.

These authorities may include power, gas, water utilities, local government, traffic authorities, police, the EPA (if noise, dust or water pollution need to be considered) and adjoining property owners (if they or their businesses are likely to be affected by the cabling work).

Due to the variant nature of local regulations throughout Australia, the approvals required may vary from state to state and city to city. The following topics are a guide to help you discover the areas of most concern to cabler's in your area.

14.4.2 Joint use agreements

The use of shared trenches and poles is becoming increasingly popular as it saves time, cuts down costs and causes less inconvenience. Joint use agreements allowing for the sharing of trenches and poles are usually arranged between telecommunications carriers and other utility providers. However, there is no valid reason why trenches cannot be shared between other utilities and licensed cabler's providing the same requirements are met eg. minimum separation distances. AS/ACIF S009:2001 clauses 5.5.3 and 5.5.4 detail the requirements for sharing of trenches/poles with other services.

Also AS/ACIF S009:2001 clauses 5.5.4.5.2 (a) & (j) and 5.5.4.6 (b) makes mention of a 'CJC-1 and Crossings Code'. The 'Crossings Code' was an ESSA/TELSTRA agreement. The CJC codes are now administered by Standards Australia and represent power utilities and carriers.

In general terms, cables may be attached to electrical poles, however, the pole space can usually only be leased from the electrical utility who owns the poles (eg. Carriers lease pole space from the electrical utilities to erect their Cable TV cables). Check with the utility concerned before carrying out any work.

14.4.3 Local government Requirements

Local governments have jurisdiction over any development, whether on private or public property. As far as the cabler is concerned, digging trenches, boring under footpaths or roads, erecting aerial cable, installing pits, pillars and cabinets in public places all require local government approval before the work can proceed.

14.4.4 Traffic Control Regulations

Before performing any cabling work involving the control or redirecting of traffic it is very important to obtain permission from the appropriate authorities. The appropriate authority may vary from state to state. As a general rule however, the local council is responsible for suburban streets and the state's Road Traffic Authority is responsible for major highways and feeder roads. In some states the police are responsible for road closures. In most cases the best place to start is the local council.

If they are not responsible they will be able to direct you to the correct government authority.

It should also be noted that permission to close a road may only be granted if certain conditions are met. Conditions include but are not limited to work being carried out only during off peak hours, the weekend, with police present to redirect traffic or only with half the road closed at any one time.

Traffic control regulations vary from state to state. In some Australian states, police are ultimately responsible for traffic control. In other states separate government departments are responsible for road closures and work on public roads. Before performing any cabling work involving the control or redirection of traffic, it is important to obtain permission from the appropriate authorities.

The best place to start any investigations is usually with the local police. They will either be responsible or they will be able to direct you to the appropriate department.

When obtaining permission to totally or partially close a road for works it is important to obtain details on the signaling and control measures to be used. Again these requirements will change from state to state. Each situation must be taken on it's own merit as local conditions and regulations will apply.

14.5 Self Help Questions

1. If you are required to make penetrations into the building when installing external cabling on private property. What must you do to the penetrations?

---

2. What is meant by Dial before you Dig?

---

3. What is a joint use agreement?

---

4. What is meant by the term reinstatement?

---

5. List the normal steps required to access and reinstate a trench in a domestic premises.

NOTE: Assessment for this section will be by completing **Activity 2**.

When you have completed the Self Help questions go on & complete Activity 2.

Section 15 Miscellaneous legislation

15.1 Introduction

Purpose

The purpose of this section is to introduce you to miscellaneous legislative requirements that may be associated with telecommunications cable installations.

Objectives

At the end of this section you will be able to:

- Outline the impact of the Environment Protection Act on Cabling
- Identify local Noise Abatement requirements
- Describe the associated practices in mines and hazardous locations
- Outline confined spaces requirements

Assessment criteria

The assessment for this section will be in the form of completing **Activity 6**.

Resources

The following resource is required to complete this section:

- AS 3000: 2000 Wiring Rules
- Local Council information.

15.2 Overview

Within the telecommunications industry there are a number of legislative requirements that the cable installer should be familiar with if the need arises. In this section you will investigate some of this legislation and research the particular requirements for your state and local area. The case study at the end of this section forms part of your assessment and will help you in this task.

15.3 Cabling and the Environment

Cabling work on both private and public property may come under the jurisdiction of environment protection legislation. The legislation is designed to protect the environment and people from all forms of pollution. Sources of pollution mainly fall into the following categories:

- **Noise Pollution**

Today noise pollution is taken very seriously and is considered a real form of pollution. Any noise that is offensive to others, or is capable of causing damage to peoples hearing may be regarded as noise pollution. Most state laws limit noise to an acceptable level or require the elimination of noise. These laws will vary from state to state, in most cases it is left to the Environmental Protection Authority (EPA) to enforce these laws and in other cases it is left to local government to enforce Noise Abatement laws.

Many activities associated with cabling can produce unacceptable noise. The use of some power tools, a pneumatic hammer to break up a concrete footpath, a back hoe or trenching machine may all result in the production of offensive noise. Usually, restrictions will be placed on maximum noise levels that are considered to be unacceptable. Maximum noise levels are usually measured in dB SPL (the sound pressure level measured in decibels). As an example the normal threshold of hearing is considered to be 0dB SPL. Power tools generate 110dB SPL and a pneumatic hammer approximately 130dB SPL. It should be noted that temporary loss of hearing can occur at 90dB SPL and permanent damage to hearing can occur at 120dB SPL. The threshold of pain is 128dB SPL. The hours during which noisy work can take place are also restricted. *It is up to the cabler to determine the noise abatement requirements for each installation and to comply with these regulations.*

- **Visual Pollution**

The visual environment in which we live may also be protected by pollution control legislation. This legislation may be of particular importance in areas of natural or cultural heritage. However, if aerial cable, or the erection of poles, or the cables impair a person's scenic view or ruin the character of the area, the installation may be in breach of this legislation. In fact as far as the telecommunications industry is concerned, the running of aerial cables most frequently comes under the scrutiny of these laws.

Again it is fair to say that legislation may vary between states and local government authorities. Local governments may zone certain areas to protect the visual environment and maintain the character of that area. In the case of Cable T.V. federal legislation has been passed, which overrides state and local government legislation to some extent.

- **Water Dust and Waste Pollution**

When trenching or digging, cablers should not allow dirt or soil to be washed into any nearby gutters, drains or waterways. Nor should they allow soil removed from trenches and holes to blow away in the form of dust. Barricades or covers may need to be used to prevent this from happening. All waste cabling products should be disposed of properly. Most products are safe for normal disposal, however some products require special attention. Any chemicals should be disposed of in accordance with the manufacturers' recommendations. This may include items such as solvents, cleaners or filling from silicon-based jelly filled cable. Other materials such as lead from lead sheathed cables, copper in old cable and some PVC sheathed cable should be recycled. *It should also be noted that care should be taken when removing or handling old cotton sheathed internal cable (usually grey in colour), as this type of cable has been impregnated with arsenic to act as a rat poison.*

15.4 Hazardous Areas and Mines

15.4.1 What is a hazardous area?

In the context of this section a hazardous area can be defined as any area where flammable or combustible materials are used. In these areas there is a real danger that a spark from the use of electricity (from a power source or communication system) could cause a fire or explosion.

To prevent any electrical equipment from becoming a source of ignition in a hazardous area, proper precautions must be taken in the design, construction and installation of equipment (refer to Installations in Hazardous Areas below).

The explosive atmosphere in a hazardous area may result from the presence of a flammable liquid, vapour or gas, or the presence of a combustible dust. It is also important to note that not all areas of an installation will be regarded as hazardous. It is normal practice for industry to minimise hazardous areas through good design. If this is the case the installer may be able to locate all the equipment and cable outside the hazard zone. If equipment has to be installed within restricted areas then special precautions must be taken.

In practice (depending on the degree of danger), Hazardous areas are defined in terms of class and zones. For example 'Class 1 Zone 2' hazardous area. AS3000:2000 (electrical wiring rules), section 7.9 defines these hazardous areas as follows:

(c) **Class 1**

2. Class 1 areas are those areas in which flammable gases or vapours are or may be present in the air in sufficient quantities to produce an explosive gas atmosphere. Within Class 1, three zones are recognised as follows:

   (i) **Class 1 Zone 0** -an area in which an explosive gas atmosphere is present continuously, or is expected to be present for long periods.

   (ii) **Class 1 Zone 1** -an area in which an explosive gas atmosphere is likely to occur in normal operation.

   (iii) **Class 1 Zone 2** -an area in which an explosive gas atmosphere is not likely to occur in normal operation and if it does occur it will exist for a short period only.

(d) **Class II**

- Class II areas are those areas which are hazardous because of the presence of combustible dust, fibres or flyings.

15.4.2 Who is Responsible?

There are two main areas of responsibility when it comes to government legislation covering hazardous areas.

- Underground coalmines are clearly covered by state legislation (refer to mining installations section).
- Other hazardous areas are covered by miscellaneous state legislation with various departments administering this legislation. (For example the Hazchem, EPA and health department).

Apart from these government bodies, there are a number of other groups who may have interests or responsibilities when it comes to hazardous areas other than coalmines. These may include:

- The owner or occupier.
- The electrical inspecting authority.
- The insurance company.
- Industry consultants or governing bodies.

15.4.3 General Installations Requirements in Hazardous areas

The main rule for any electrical or telecommunications installation is to avoid hazardous areas. **Wherever possible, all equipment, cabling, joints, pits, pillars, cabinets, distributors and telecommunications outlets should be placed outside of a hazardous area.**

Any equipment that may be a source of ignition (eg. by sparking) must be kept outside the hazard zone. This includes any bare wire or connections, telecommunications outlets, terminal blocks, distributors, joints, etc. Any customer equipment (eg. telephones, fax machines, modems, telemetry equipment, etc.) installed within a hazard zone must be designed and installed for use in that defined hazard zone. *In some cases the use of fibre optic cable may be mandatory (terminating ordinary cable, or loose connections could cause an explosion).*

A cabler should check all current applicable standards prior to performing any installation work in a hazardous area.

Any cable which traverses a hazard zone must be one continuous run and adequately protected against mechanical and chemical damage which may result in arcing or sparking between conductors or between conductors and earth. Generally speaking, aerial cabling should not be used.

Where underground cabling is run into a hazard zone, steps must be taken to prevent "piping" of flammable liquid or gas to other areas or propagation of an explosion. This may be achieved by burying the cable* directly into the ground without the use of conduit, or by ensuring that the entry and exit points of the conduit are sealed. Similarly, any above-ground (eg. indoor) conduit used to run cabling into a hazard zone must be sealed at the entry and exit points of the cable.

* Such cable should be grease-filled to prevent the passage of liquid or gas via the cable sheath.

NOTE: Precautions should also be taken, eg. by suitable location or selection of customer equipment, to ensure that cord-connected customer equipment cannot be taken or dropped into the hazard zone by the user.

If terminations or equipment are to be installed in a hazardous area then they must be enclosed in a suitable enclosure that is rated to suite the area. It is worthwhile noting that special explosive proof phones are available and may have to be used in some areas (this is the case in coalmines and oil refineries, as the switch hooks in ordinary phones may cause a spark igniting explosive gases).

It is beyond the scope of this module to discuss every detail associated with these installations. It is simply enough to know that installations in these areas are specialized and require a properly engineered solution that must comply with all relevant codes.

As per AS/ACIF S009:2001 *(clause 5.1.9)*, equipment, including cabling, TO's and other connecting hardware for use in hazardous areas as defined in AS 2430, shall be selected and installed in accordance with:

- AS 2381.1 for Class I areas; and
- AS 2381.10 for Class II areas.

Note: Classification of hazardous areas is the responsibility of the premises owner or customer.

Generally speaking, if the TO and associated cabling cannot be installed outside the hazardous zones, the customer must arrange their installation in accordance with applicable standards or codes by a suitably qualified person.

Class I areas may include, but are not limited to:

- *Vehicle workshops below ground or street level* used for service, repair or storage of more than three liquid or gas fuelled vehicles at any one time;

Note: Workshops on floors at or above adjacent ground or street level and provided with adequate ventilation are regarded as non-hazardous areas.

- *Vehicle parking areas below ground or street level* used exclusively for the parking of vehicles and which are not used for other than minor service or repair operations on such parked vehicles;

Note: Parking floors at or above adjacent ground or street level and provided with at least one outside door for vehicle access at the lowest level are regarded as non-hazardous areas.

- *Residential garages below ground or street level* in which not more than three liquid or gas fuelled vehicles may be garaged and which will not be used for other than minor service or repair operations on such vehicles;

Note: Residential garages on floors at or above adjacent ground or street level and provided with at least one outside door at or below floor level are regarded as non-hazardous areas.

- *Aircraft hangars*, which include areas for storage or servicing of aircraft in which petrol, jet fuels or other volatile flammable liquids, or flammable gases, are used;
- *Petrol and LP gas dispensing stations*, including areas where petrol or LP gas is transferred by means of a dispensing pump or similar dispensing device to the fuel tanks of self-propelled vehicles or waterborne craft;
- *Major refineries and chemical plants*, including oil refineries, petrochemical and continuous chemical process areas and locations where petrol or other volatile flammable liquids, liquefied flammable gases, or compressed flammable gases are produced, processed, handled, transported or stored;
- *Flammable liquid areas* where flammable liquids are produced, processed, handled, transported or stored;

Note: This does not apply to the storage and use of flammable liquids in quantities up to:

- 100 litres in closed containers;
- 25 litres for decanting purposes, eg. petrol transfer to a motor vehicle or lawn mower;
- 5 litres in open containers for occasional use;
- 1 litre in open container for continuous use;
- Cylinders, each not exceeding 11 litres capacity, when in use; and
- Disposable containers stored in a well-ventilated location.

- *Flammable gas areas* where flammable gases are produced, processed, handled, stored or used;

Note: Flammable gases include LP gas (propane, propylene, butane, isobutane), butadiene, vinyl chloride, hydrogen, methane, carbon monoxide, and ethylene.

- *Finishing process areas* where paints, lacquers or other flammable finishes are regularly or frequently applied by spraying, dipping, brushing or by other means, where volatile liquids are used, or where readily ignitable deposits or residues from such paints, lacquers or finishes may occur;

Note: This includes spraying, cleaning and thinning areas of motor body repair and finishing workshops.

- *Flammable medical agents areas*, including areas in which flammable medical agents are stored and anaesthetising areas;
- *Fume cupboards and laboratories* in which any flammable liquids or gases are used;
- *Fruit ripening rooms or chambers* in which bananas, oranges or other fruit or vegetables are degreened by the introduction of ethylene, propylene, manufactured gas or other flammable gases;
- *Special chemical processing areas* and similar industries using volatile flammable liquids; and
- *Sewage treatment plants and sewage pumping stations* in which explosive gas may be released into the atmosphere.

Note: Typical sources of explosive gases are valves, expansion joints, flanges, pressure relief valves, compressors, gas meters, sediment traps, regulators and areas around sludge digestion tanks.

Class II Areas

Class II areas are those areas which are hazardous due to the presence of combustible dust, fibres or flyings. Combustible dust is a dust that is combustible or ignitable in mixtures with air. Combustible dusts are classified in accordance with AS 2430.2, *Classification of Hazardous Areas, Part 2: Combustible Dusts.*

The following are provided as examples of installation restrictions in hazardous areas. Cablers should check with all current requirements before proceeding with installations in hazardous areas.

Aircraft Hangars

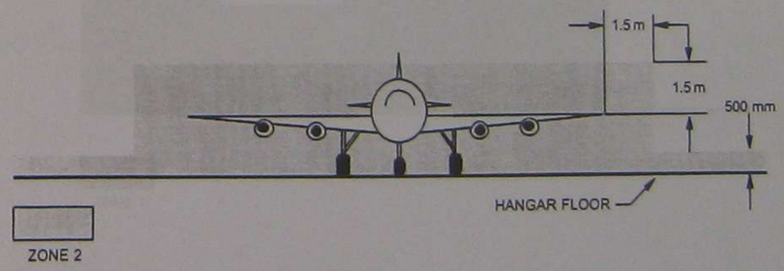
The entire floor area of the hangar up to a level of 500 mm from the floor, including any adjacent and communicating areas not suitably separated from the hangar, is classified as a hazardous area. Additionally, the area within 1.5 metres horizontally from aircraft engines, aircraft fuelling tanks, points and vent outlets, or aircraft structures containing fuel, and extending upward from the floor to a level 1.5 metres above the upper surface of wings and of engine enclosures, forms part of the hazard zone (see Figure 1).

This does not include adjacent areas in which hazardous vapours are not likely to be released such as stock rooms, electrical control rooms and other similar locations, if adequately ventilated or if separated from the hangar itself by a vapour barrier.

Any customer cabling or customer equipment installed within the hazard zone must comply with the requirements of the relevant authority. Any cabling, terminal blocks, telecommunications outlets, telephones or other equipment installed within the hazard zone must be of a type suitable for use in Class I, Zone 2.

Generally, cabling and equipment will be outside the hazard zone if installed on a fixed wall or bench at least 500 mm above the floor or inside a room, which is outside the hazard zone.

Figure 1 — Hazard zone in aircraft hangar

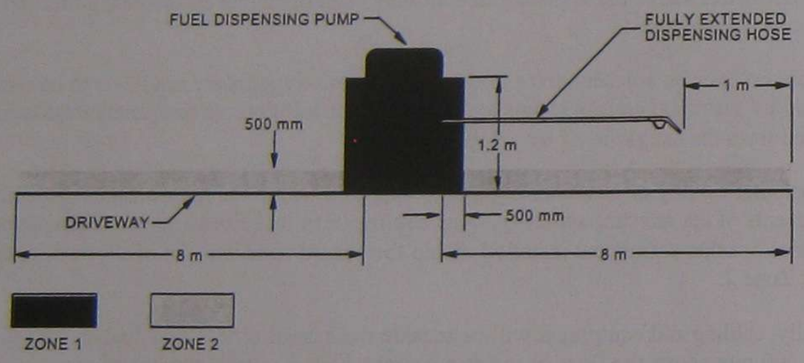


Petrol and LP Gas Service Stations

The fuel dispensing/pump areas of service stations are classified as hazardous areas. For petrol pumps, the hazard zone extends 8 metres horizontally from any dispensing pump, or 1 metre from any fully extended hose nozzle, whichever is the greater distance (see Figure 2). For LP gas dispensing devices, the extent of the hazard zone differs and depends on the type of dispensing device (refer AS 2430.3).

Any customer cabling or customer equipment installed within a hazard zone must comply with the requirements of the relevant authority. Any cabling, terminal blocks, telecommunications outlets or other equipment installed in, on or adjacent to, a petrol or gas dispensing unit must be of a type suitable for use in Class I, Zone 1.

Figure 2 — Hazard zone for petrol pump in outdoor location



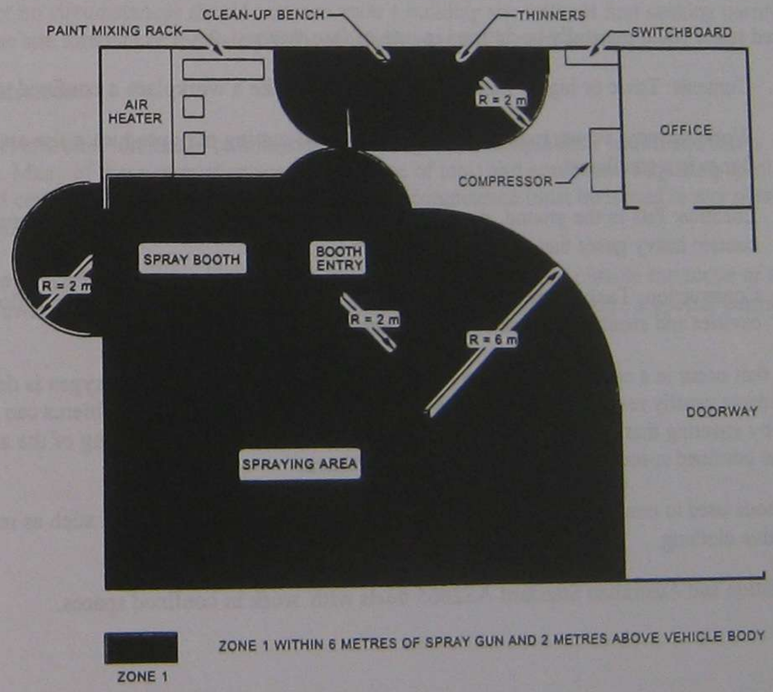
Motor Body Repair Workshops

A motor body repair and finishing workshop (eg. panel beating works) generally contains a spraying area and/or spray booth and an area for preparation, decanting, thinning or cleaning up paint. Such areas are defined hazard zones extending as follows:

- The interior of a spray booth and its exhaust ducts and the area within 2 metres (calculated as vapour path) in any direction of the entrance of the spray booth.
- Where spraying is not conducted within a spray booth and for dip tanks and their drainage boards, the area within 6 metres in any direction horizontally from the source of the hazard and up to a level of 2 metres above the article being sprayed or dipped.
- Where preparation, decanting or clean-up occurs, the area within 2 metres in all directions of a source of hazard.

A typical workshop layout and applicable hazard zones are illustrated in Figure 3

Figure 3 — Typical motor body repair workshop



15.4.4 Mining Installations

As mentioned earlier mining installations are covered by state legislation and any installation in a mine must comply with this legislation. Many areas in and around mines require special installation requirements. As a general rule underground mines have much more stringent requirements than open cut mines. This is largely due to the hazardous gases (usually methane) often found in these mines.

Underground coalmines must only use equipment approved by the Chief Inspector of Coal Mines (CICM). Again it is beyond the scope of this module to describe all the requirements of mine installations.

15.4.5 Occupational Health and Safety Requirements

Module NTE001 specifically deals with Occupational Health and Safety (OH&S) aspects that need to be known by cabler's. However, because students should be made aware of OH&S issues in all situations the following information is supplied, as it is not covered in module NTE001.

Confined spaces

A confined space could generally be defined in one of four ways:

1. Contents: Toxic or highly flammable gases may make a workplace a confined space.
2. Work Activity: Power tools, welding and thermal cutting may produce noise and toxic fumes in a small area.
3. Location: Pits in the ground, distributors located in basements and low work areas may contain heavy gases that can replace oxygen.
4. Construction: Tanks, pipelines, underground tunnels and walkways, roof and floor cavities and similar enclosed structures may constitute a confined space.

Accidents that occur in a confined space are often fatal as air becomes toxic or oxygen is depleted. These accidents usually result from a failure to recognise the situation. Many problems can be simply overcome by ensuring that there is adequate ventilation in confined spaces. Testing of the air before entering the confined space will also prevent many problems.

Other methods used to control confined spaces are personal protective equipment such as respirators and protective clothing.

State legislation and Australian Standard AS2865 deals with work in confined spaces.

15.4.6 Site Inductions

Many large building, construction and hazardous sites, for example mines, oil refineries, utilise a process of site induction for new workers attending the site. The main purpose of site inductions is to familiarise workers with specific safety and work related issues pertaining to a particular site. Site inductions may be organised by unions, employers (or both) or the main Building Contractor and tend to concentrate on the do's and don'ts relating to work issues and safety. Some examples are:

- The wearing of safety helmets, boots and protective clothing.
- The use of approved ladders, or the use of scissor lifts in lieu of ladders altogether.
- The use of approved electrical extension leads and power tools.
- What various emergency sirens and alarms mean and what to do in an emergency.
- Who the site foreman/union rep. is, where to locate them, signing the site book, wearing of nametags etc. whilst on site.
- Any site specific entitlements or allowances.

Note: Under no circumstances should a person enter a building site without first seeking permission to do so. The site foreman or the Safety Officer usually grants this permission.

Other requirements

There are several other factors to be considered with regard to occupational health and safety regulations. Many of these regulations concern the use of tools and equipment requiring special training and certification. For example, a certificate of competence must be issued to any person using a boom lift or driving a forklift.

There are several other situations where this may occur, each one being outside the scope of this course. Be aware that any equipment that is inherently dangerous may require a special permit.

15.5 Self help questions

1. List 3 types of pollution and give an example of each one.

---

2. Why are underground mines dangerous locations?

---

3. What types of materials make an area hazardous?

---

4. Section 7.9 of AS 3000:2000 defines a hazardous area. Write this definition in the space below.

Section 16 Telecommunications Awards and Conditions

Purpose
The purpose of this section is to give you information on Telecommunications awards and agreements and to familiarise you with common site induction procedures.

Objectives
At the end of this section you should be able to:

- Describe the federal and state industrial systems.
- Describe the differences between Awards and other industrial Agreements.
- Describe the procedures for a typical site induction.

Assessment Criteria
The assessment for this section will be in the form of completing the Case Study in this section.

Resources
The following resource is required to complete this section:

- Samples of Telecommunications awards or Certified Agreements

With reference to AS 3000:2000 answer the following

5. What is a Class 1 hazardous area?

---

6. What is a Class 1 Zone 1 hazardous area?

---

7. List 3 examples of a Class 1 hazardous area?

---

8. What is a Class 2 hazardous area?

---

9. Before commencing work on a construction site what must a cabler do before being allowed to commence work on the site?

NOTE: Assessment for this section will be by completing **Activity 3**.

Complete Activity 3 when you have completed the self-help questions.

Options

The options available to employers/employees are:

- Informal Agreement - that is not covered by an Award, AWA or CE, can be either written or verbal
- Award
- Award plus over award provisions
- Certified Agreement (CA)
- Australian Workplace Agreement (AWA)
- State Agreement

16.1 Overview

Anyone working in a job has a personal interest in all matters that may affect them in the workplace. These may include things like hours of duty, pay levels, working conditions, safety and career advancement. Employers also have concerns that their employees will work to an expected level and be productive in their work. In other words employers and employees both have obligations toward each other and these are usually spelt out in industrial awards and agreements.

In this section you will learn about various types of awards and agreements that relate to the telecommunications industry.

16.2 Industrial Relations in Australia

The industrial relations system in Australia is constantly undergoing changes and to some extent is governed by which political persuasion is in office. In other words government legislation, both federal and state can affect the powers of the industrial relations commission. Despite these changes, the agreements reached between employers and employees spell out the obligations and rights of each party and are effectively a legally binding contract. Ideally both parties are fairly represented when these agreements are drawn up so that the relationship between the two parties forms the basis of true industrial relations.

Prior to 1996 most workers were covered by, either Enterprise/workplace agreements or State and Federal Awards with each State/Territory and the Federal Government having its own Industrial Relations Commission. Awards and agreements contained a great deal of information regarding work practices, commitments and rewards. These awards/agreements usually went into great detail and included among other things:

- What positions were covered, or who was covered by the award/agreement.
- Stated normal hours of duty, shift work, overtime and allowances.
- Rates of pay, meal and tea breaks, leave and other entitlements.

In 1996 the federal government introduced a new act known as the Workplace Relations Act 1996 (the WR act). Under the new act, the Australian Industrial Relations Commission's (AIRC) award-making role was changed and re-focused on setting a safety net of fair and enforceable minimum wages and conditions. The WR act places the primary responsibility for determining wages, conditions and work practices on employers and employees. These arrangements are now determined as far as possible by agreement between the employer and employees at the enterprise or workplace level.

This is to provide greater choice and flexibility for parties in reaching agreements. The WR act provides for a variety of agreement types in recognition that different arrangements best suite the needs of different firms and the type of work they do.

16.3 Awards and Agreements

16.3.1 Informal Agreements

Informal agreements may be made with one or more employees and may be verbal or in writing and may be enforceable at common law. Because the WR act recognises the role of informal agreements they are a legitimate part of the employment contract.

However, an informal agreement does not displace or prevail over any award or other formal agreement that applies to the employee.

16.3.2 Formal Agreements

Formal agreements are legislated written agreements that are lodged with an authority such as an industrial relations tribunal or employment advocate for registration and approval. Formal agreements under the WR act take precedence over informal ones.

See Awards, AWA's and CA's for further details.

Certified Agreements (CA)

Certified agreements are *collective* agreements made directly between employers and a group of employees, or between and an employer and a union/unions representing those employees. CA's usually apply to large organisations. Under the WR act, CA's can be made by constitutional corporations, or by any Commonwealth, Australian Capital Territory, Northern Territory or Victorian employers, or by employers in a prescribed area of interstate or overseas trade or commerce.

CA's are lodged with the Australian Industrial Registry for certification. The AIRC will then schedule a hearing to consider the certification of each agreement.

For a CA to be successful the CA must meet certain criteria. These include, but are not restricted to:

- CA's must have procedures for preventing and settling disputes
- Contain a nominal expiry date (usually 3 years)
- Must not discriminate against or between employees party to the CA
- List all the parties to the agreement
- Not disadvantage employees in terms of their overall conditions of employment (when compared with existing awards etc)
- Discriminate against employees on the basis of their membership or non-membership of a union, or of a particular union
- Also for a CA to be successful the parties involved must not have breached certain requirements when reaching agreement. Again these include, but are not restricted to:
    - Employees have, or have ready access to, the agreement, in writing for at least 14 days prior to the agreement being approved by them
    - Are given an explanation of the terms of the agreement before approval is given
    - Majority support from employees
    - Must not discriminate against employees on the basis of their membership or non-membership of a union, or of a particular union

Australian Workplace Agreements (AWA)

An AWA is an *individual* agreement between an employer and an employee and covers the employees terms and conditions of employment. AWA's may also be negotiated between an employer and a group of employees but each individual employee party to the agreement must sign them.

Employers can make AWA's with their employees if they are constitutional corporations or the primary workplace of the employee is in one of the Commonwealth Territories or Victoria, or the employee is a waterside, maritime or flight crew officer engaged in interstate or overseas trade or commerce.

AWA's must be filed with the Office of the Employment Advocate for approval.

An AWA also completely displaces any federal or state award or agreement that would otherwise cover the employee. The only exceptions to this rule are that AWA's do not displace state laws dealing with Occupational Health and Safety (OH&S), workers compensation, apprenticeships, some traineeships or any other matters prescribed in the regulations of the WR act.

What is an Employment Advocate?

An Employment Advocate is an independent statutory officer who looks after AWA's. He or she is appointed under the WR Act and operates within the Department of Workplace Relations and Small Business.

Differences between CA's and AWA's

CA's and AWA's are similar to each other, except that AWA's are regarded as individual agreements, whereas CA's are collective in nature. AWA's are vetted and approved by the Employment Advocate whereas CA's are vetted and approved by the AIRC.

16.3.3 Federal and State Awards

Awards apply to more than one workplace and usually cover specific industries or sectors. They generally remain in force unless they are varied or terminated by an industrial tribunal, even if they include an expiry date. An industrial tribunal to provide increases in the minimum wage or changes in conditions of employment can also vary them. In other words they cover all employees working in an industry regardless of the employer or union membership of the employee.

Federal awards are different from state awards, in that they only cover employees who work for an employer listed as a respondent to the award eg. TELSTRA. As from the 1 January 1997, any new awards entered into can only contain provisions relating to what is known as the '20 allowable award matters' (see attachment A), and must meet new criteria eg. New awards can no longer contain matters of detail that are more appropriately dealt with at the workplace level and they are not to prescribe work practices or procedures that will restrict or hinder productivity.

Existing awards have been given an 18-month transitional period to enable the AIRC to assist the parties to awards to adjust them to meet the new requirements. As from the 1 July 1998, any non-allowable matters will cease to have effect and will therefore be unenforceable by law.

Victoria

As from the 1 January 1997 the Victorian government has transferred certain aspects of its industrial relations powers to the Commonwealth. Employees who were covered by a state award are now covered by the federal system.

Employment agreements made under the former Victorian Employee Relations Act 1992 remain in force until the can be replaced by a federal CA or AWR.

From January 1997 the minimum standards for Victorian employees who are not covered by a registered agreement or an award are:

- Four weeks paid annual leave
- Paid sick leave of one week per year
- Minimum wages for the industry sector work classification
- Unpaid maternity, paternity and adoption leave and an entitlement to part time work in connection with the birth or adoption
- An entitlement to a notice period for lawful termination of employment (or pay in lieu of)
- Half an hour meal breaks after five hours of continuous work.

Victorian laws covering OH&S, workers compensation, public holidays, equal opportunity, long service leave, superannuation and apprenticeship still remain in force.

The Northern Territory and the Australian Capital Territory have also handed over their state awards to the AIRC.

Specific Telecommunications Awards

When it comes to specific telecommunications awards, there are a variety of agreements in existence. If you are working for a large carrier, such as TELSTRA a federal award probably covers you. State awards or Enterprise Agreements cover many cablers' working for contracting companies or large telecommunications manufacturers. In the case study at the end of this section you will be required to investigate awards and conditions either pertaining to your job or from the sample awards/agreements given out in class.

For more detailed explanations on CA's, AWA's and awards it is best to speak to the Department of Workplace Relations & Small Business in your state or the Union/Association that represents you or the industry sector.

16.4 Attachment A

20 Allowable Award Matters

- Classification of employees and career paths.
- Working hours and the times they are performed, rest breaks and variations to working hours (but not minimum or maximum working hours for regular part time employees).
- Rates of pay – such as hourly rates and annual salaries, including rates of pay for juniors, trainees, apprentices and employees under the supported wages system.
- Piece rates, tallies and bonuses.
- Annual Leave and Leave loadings.
- Long Service Leave.
- Sick, Family, Bereavement, Compassionate, Personal/Carer's, Cultural and other like forms of Leave
- Parental Leave, including Maternity and Adoption Leave.
- Public Holidays.
- Allowances.
- Loadings for overtime, casual or shift work.
- Penalty rates.
- Redundancy pay.
- Notice of termination.
- Stand-down provisions.
- Dispute settling procedures.
- Jury service.
- Type of employment – full time, regular part time, casual or shift work (but cannot restrict the number or proportion of these types of employees).
- Superannuation.

Pay and conditions for outworkers, but only to the extent necessary to ensure that their overall pay and conditions are fair and reasonable in comparison to award covered employees who perform the same kind of work at an employer's business or commercial premises.

16.5 Self Help Questions

1. What is an Award?

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2. What is the difference between a CA and an AWA?

.....

.....

.....

.....

3. What is an Employment Advocate?

.....

.....

4. What are 'allowable matters'? List three of them

i. .....

ii. .....

iii. .....

NOTE: Assessment for this section will be by completing **Activity 4**.

Complete Activity 4 when you have completed the self-help questions.

Section 17 Assessment Testing

The overall assessment for this competency standard is by a written examination in the form of multiple-choice questions (as were many of the self help questions through out the module), short answer questions and case studies.

The assessment criterion for learning outcomes 1 to 4 is explained in Section 1.3 of this learner resource.

The exam for learning outcomes 1 to 3 will be set by the training organisation.

The Australian Communications Authority has laid down the criterion for the examination of learning outcome 4.

- The pass mark is a minimum 40 correct answers to the 50 questions listed.
- There is a 10-minute reading time prior to the 75-minute examination, for learning outcome 4.
- Examinees may use their CCM during the examination but not during the reading time.

The assessment for Learning Outcome 5 will be by the successful completion of the case studies in the activities for sections 13 to 16.

All assessments must be completed successfully to obtain competency in is module.

Section 18 Self Help Question Answers

Section 2

1. AS/ACIF S009:2001
2. A cabling system that will support a multiproduct, multivendor environment and is intended to convey all types of information.
3. ISO/IEC 11801:1995
4. The Australian Building Codes Board (A.B.C.B.)
5.
   a. Telecommunications Industry Association
   b. International Organisation for Standardisation
   c. International Electrotechnical Commission
   d. Electronics Industry Association.

Section 3

1. B
2. D
3. C
4. B
5. D
6. B
7. A
8. B
9. C, D, E
10. A, B

Section 4

1. ACA
2. Telecommunications Act 1997
3.
   - Regulate industry compliance
   - Report on telecommunications industry performance
   - Provide information about communications regulation for industry
   - Represent Australia's communications interests internationally
4. ACA