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INDUSTRY FORUM



AUSTRALIAN STANDARD

AS/ACIF S009:2006

Installation requirements for customer cabling
(Wiring rules)

**Adopted for
regulatory purposes**



Australian Standard – Installation requirements for customer cabling (Wiring Rules)

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FOREWORD

General

This Standard was prepared by the ACIF Working Committee CECRP/WC18 Cabling Standards. It is one of a series of Telecommunication Standards developed under the Memorandum of Understanding between the Australian Communications Authority (ACA) and the Australian Communications Industry Forum (ACIF).

Note: On 1 July 2005 the ACA became the Australian Communications and Media Authority (ACMA) and the Memorandum of Understanding continues in effect as if the reference to the ACA were a reference to ACMA.

This Standard is a revision of AS/ACIF S009:2001 *Installation requirements for customer cabling (Wiring Rules)*.

This Standard is the result of a consensus among representatives on the ACIF Working Committee to produce it as an Australian Standard.

Standards revision

Australian Standards developed by the Australian Communications Industry Forum (AS/ACIF Standards) are updated, according to the needs of the industry, by amendments or revision. Users of AS/ACIF Standards should make sure that they possess the latest amendments or editions. Representations concerning the need for a change to this AS/ACIF Standard should be addressed to:

The Project Manager
Customer Equipment and Cable Reference Panel
The Australian Communications Industry Forum
PO Box 444
Milsons Point NSW 1565

Regulatory notice

Attention is drawn to the fact that cabling work must be performed or supervised by a person with the appropriate cabling provider registration. This requirement is determined by legislation and subordinate regulatory instruments administered by the Australian Communications and Media Authority (ACMA).

This Standard comes into force as at 1 July 2006. Until that date AS/ACIF S009:2001 remains in force.

ACMA is a Commonwealth Authority with statutory powers to impose requirements on cabling providers concerning customer cabling.

Details on cabling regulations can be obtained from the ACMA website at www.acma.gov.au or by contacting ACMA at:

Australian Communications and Media Authority
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Law Courts PO
Melbourne VIC 8010
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Introduction

This introduction for the AS/ACIF S009:2006 **Installation requirements for customer cabling (Wiring Rules)** Standard is not an authoritative section of this Standard and is only provided as guidance for the user of the Standard to outline its objectives, the factors that have been taken into account in its development and to list the principle differences between the new and the previous edition.

The reader is directed to the Clauses of this Standard for the specific requirements and to the Australian Communications and Media Authority (ACMA) for the applicable Cabling Provider Rules arrangements.

Note: The Cabling Provider Rules can be obtained from the Australian Communications and Media Authority (ACMA) website at www.acma.gov.au.

The objective of this Standard is to set out minimal requirements that may ensure the safety and integrity of a cabling installation and of the telecommunications network to which it is, or will be, connected, and to provide additional guidance for compliance with these requirements.

The objective of this revision is to update requirements to accommodate regulatory and technological changes and feedback from industry.

The principle differences between this edition of AS/ACIF S009 and the previous edition are:

- (i) content restructured with extensive use of headings
- (ii) increased informative content
- (iii) voltage classifications redefined
- (iv) service classifications added
- (v) general principles and objectives added
- (vi) fire detection and fire alarm system cabling variations accommodated
- (vii) building control system cabling variations accommodated
- (viii) EPR and LFI requirements amended and informative content added
- (ix) damp area restricted zone requirements amended
- (x) cable support requirements amended
- (xi) conduit requirements amended
- (xii) service separation requirements amended
- (xiii) 'network boundary distributor' term removed and 'MDF' reinstated
- (xiv) NTDE concept abandoned and requirements deleted (NTD remains)
- (xv) telecommunications outlet information expanded
- (xvi) aerial cabling requirements amended
- (xvii) functional earthing requirements amended

- (xviii) protective earthing information amended
- (xix) TFE requirements added instead of cross-reference to AS/NZS 3000
- (xx) two new earthing diagrams added (Figure 5 and Figure 6)
- (xxi) Appendix D (formerly Appendix A) amended
- (xxii) Appendix F (formerly Appendix C) amended
- (xxiii) appendices renumbered and the following new appendices added:
 - A Restricted zones in damp locations (normative)
 - B Cable colour codes (informative)
 - C Telecommunications outlets (informative)
 - G LV telecommunications circuits (informative)
 - H Interference from HV power systems (informative)
 - I The IP Code (informative)
 - J The network boundary (informative)
 - K Cabling Provider Rules (informative)

Appendix A forms an integral part of this Standard. Appendices B to K are for information only.

WARNING

This Standard includes requirements intended to ensure the safety of customers, cabling providers, carrier staff, and the general public. However, cabling providers are reminded that metallic telecommunications conductors, earth connections, metallic parts, etc. may, at any given time, be at a voltage that exceeds the Telecommunications Network Voltage (TNV) rating of AS/NZS 60950.1. Examples of an overvoltage condition may include:

- **contact with AC mains power through customer equipment failure or cabling faults;**
- **power feeding;**
- **surge currents and induced voltages through power system faults.**

Accordingly, cabling providers working on customer cabling are warned to treat the metallic parts of a telecommunications installation as potentially harmful.

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1 SCOPE

1.1 Application

This Standard applies to the installation and maintenance of fixed or concealed cabling or equipment that is connected, or is intended to be connected, to a telecommunications network, including any cord or cordage, or that part of any cord or cordage, that is connected as fixed or concealed cabling.

This Standard does not apply to any electrical power cabling whose primary function is the distribution of AC mains supply, and which is connected to an AC mains supply, but which may also carry telecommunications signals as a secondary function as long as the telecommunications signals originate from the power network or are injected into the power cabling via a compliant interface device.

This edition of the Standard deals with cabling work that was previously exempt from ACMA technical regulation or that was not specifically addressed by previous editions. Refer to Appendix G for a description of the changes made to accommodate such cabling and an explanation of how such cabling is captured by the telecommunications legislation.

1.2 Date of effect

This Standard comes into force as at 1 July 2006. Until that date AS/ACIF S009:2001 remains in force.

1.3 Limitations

The requirements in this Standard are generally limited to—

- (a) protecting the health and safety of persons; and
- (b) protecting the integrity of a telecommunications network or a facility.

However, additional information is provided for guidance.

1.4 Basic aims

This Standard covers design and construction practice sufficient to ensure that—

- (a) the installation or normal use of the cabling does not expose carrier personnel, cabling providers, customers or other persons to any danger; and
- (b) the installation or normal use of the cabling does not adversely affect the integrity (proper end-to-end functioning) of a telecommunications network.

1.5 Topics

In achievement of its basic aims, this Standard addresses the following matters:

- (a) Connection of the installation to the telecommunications network (network boundary).
- (b) Protection of the installation from foreseeable physical damage (e.g. impact, weathering, corrosion) or interference from other circuits (e.g. crosstalk, noise).
- (c) Mitigation against the effects of earth potential rise and low frequency induction.
- (d) Protection of end-users from exposure to hazardous voltages, telecommunications network voltages, radiation hazards or the ingress of dangerous fluids or gases to the building.
- (e) Prevention of injury to any person due to the improper installation of such things as catenary supports, pits, access holes or enclosures.
- (f) Installation of cabling in hazardous areas (explosive atmospheres).
- (g) Protection of carrier personnel, cabling providers and other workers from exposure to site hazards or contact with hazardous services.
- (h) Prevention of fire caused by improper installation or use of the cabling, and compliance with the Building Code and Occupational Health and Safety (OH&S) requirements.
- (i) Identification of lines and services to minimise the risk of accidental interference, improper use or disconnection of telecommunications network services.
- (j) Protection of persons from exposure to earthed cables, equipment or objects (including ground) that may be at a different electric potential.
- (k) Protection of end-users from overvoltages caused by atmospheric discharges (e.g. lightning) or power system faults.
- (l) Prevention of damage to the earthing system of the electrical installation due to electrolytic corrosion caused by DC Currents in the telecommunications earthing system.

Note: This Standard should be read in conjunction with AS/ACIF S008 which specifies the requirements for cabling products intended for connection to the customer side of the boundary of a telecommunications network.

2 REFERENCES

2.1 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies.

In the event of a discrepancy between this document and a referenced document, this document takes precedence.

Publication	Title
Australian Standards	
AS 1735.2-2001	Lifts, escalators and moving walks - Passenger and goods lifts - Electric
AS/NZS 1768(Int):2003	Lightning protection
AS/NZS 2053.1:2001	Conduits and fittings for electrical installations - General requirements
AS/NZS 2211.1:2004	Safety of laser products - Equipment classification, requirements and user's guide (IEC 60825-1:2001, MOD)
AS/NZS 2211.2:1997	Laser safety – Safety of optical fibre communication systems
AS/NZS 2381.1:2005	Electrical equipment for explosive gas atmospheres - Selection, installation and maintenance - General requirements
AS/NZS 2648.1:1995	Underground marking tape - Non-detectable tape
AS/NZS 3000:2000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 4117:1999	Surge protective devices for telecommunication applications
AS 4262	Telecommunication overvoltages
AS 4262.1-1995	Part 1: Protection of persons
AS 4262.2-1999	Part 2: Protection of equipment
AS 60529-2004	Degrees of protection provided by enclosures (IP Code)
AS/NZS 60950.1:2003	Information technology equipment - Safety - General requirements
AS/NZS 61241.14:2005	Electrical apparatus for use in the presence of combustible dust - Selection and installation (IEC 61241-14, Ed.1.0(2004) MOD)
AS/ACIF Standards	
AS/ACIF S006:2001	Requirements for Customer Equipment, operating in the voiceband, for connection to the non-switched Telecommunications Network

Publication	Title
AS/ACIF S008:2006	Requirements for customer cabling products
AS/ACIF S043	Requirements for Customer Equipment for connection to a metallic local loop interface of a Telecommunications Network
AS/ACIF S043.1:2003	Part 1: General
AS/ACIF S043.2:2005	Part 2: Broadband
AS/ACIF S043.3:2001	Part 3: DC, low frequency AC and voiceband
Other references	
ESAA/Telecom Code of Practice Issue 1 Jan. 1984	Joint Electricity Supply Code of Practice Association of Australia and Telecom Code of Practice (Protection of Personnel and Equipment against Earth Potential Rises caused by High Voltage Power Systems Faults)
SAA HB 101-1997 (CJC 5)	Coordination of power and telecommunications – Low Frequency Induction (LFI): Code of practice for the mitigation of hazardous voltages induced into telecommunication lines
SAA HB 102-1997 (CJC 6)	Coordination of power and telecommunications – Low Frequency Induction (LFI) Note: Application Guide to the LFI Code

2.2 Informative references

The following documents are referred to in this document for guidance.

Publication	Title
Australian Standards	
AS ISO 1000-1998	The international system of units (SI) and its application
AS/NZS 1367:2000	Coaxial cable systems for the distribution of analogue television and sound signals in single and multiple unit installations
AS/NZS 2430.3	Classification of hazardous areas - Examples of area classification
AS/NZS 2430.3.1:2004	Part 3.1: General
AS/NZS 2430.3.2:2004	Part 3.2: Vehicle workshops, vehicle parking, fuel dispensing stations and aircraft hangars
AS/NZS 2430.3.3:2004	Part 3.3: Flammable liquids
AS/NZS 2430.3.4:2004	Part 3.4: Flammable gases

Publication	Title
AS/NZS 2430.3.5:2004	Part 3.5: Refineries and major processing plants
AS/NZS 2430.3.6:2004	Part 3.6: Laboratories, including fume cupboards and flammable medical agents
AS/NZS 2430.3.7:2004	Part 3.7: Landfill gas, sewage treatment and sewage pumping plants
AS/NZS 2430.3.8:2004	Part 3.8: Surface coatings and adhesives
AS/NZS 2430.3.9:2004	Part 3.9: Miscellaneous
AS/NZS 3013:2005	Electrical installations – Classification of the fire and mechanical performance of wiring system elements
AS/NZS 3015:2004	Electrical installations – Extra-low voltage d.c. power supplies and service earthing within public telecommunications networks
AS/NZS 3080:2003	Telecommunications installations – Generic cabling for commercial premises (ISO/IEC 11801:2002, MOD)
AS/NZS 3084:2003	Telecommunications installations – Telecommunications pathways and spaces for commercial buildings (ISO/IEC 18010:2002, MOD)
AS/NZS 3085.1:2004	Telecommunications installations – Administration of communications cabling systems – Basic requirements
AS 3815-1998	A guide to coaxial cabling in single and multiple premises
AS/NZS ISO/IEC 15018:2005	Information technology — Generic cabling for homes
AS/NZS 60079.10:2004	Electrical apparatus for explosive gas atmospheres - Classification of hazardous areas (IEC 60079.10:2002 MOD)
AS/NZS 61241.10:2005	Electrical apparatus for use in the presence of combustible dust - Classification of areas where combustible dusts are or may be present
AS/ACIF Standards	
AS/ACIF S003:2005	Customer Access Equipment for connection to a Telecommunications Network
AS/ACIF Industry Codes	
ACIF C524:2004	External Telecommunication Cable Networks
ACIF C559:2005 Part 1	Unconditioned Local Loop Service (ULLS) Network Deployment Rules - Performance Requirements

Publication	Title
Other references	
SAA HB 13-2000	Electrical equipment for hazardous areas
SAA HB 100-2000 (CJC 4)	Coordination of Power and Telecommunications — Manual for the establishment of safe work practices and the minimization of operational interference between power systems and paired cable telecommunications systems

3 DEFINITIONS AND ABBREVIATIONS

For the purposes of this document, the following terms and definitions apply.

If there is any conflict between the definitions used in this document and the definitions used in the *Telecommunications Act 1997* (the Act), the Act takes precedence.

3.1 Definitions

3.1.1 AC mains supply

an AC power distribution system external to the equipment for supplying power to AC powered equipment.

Note 1: Power sources may include public or private utilities and equivalent sources such as motor-driven generators and uninterruptible power supplies.

Note 2: Adapted from AS/NZS 60950.1:2003.

3.1.2 aerial cabling

cabling that is suspended between poles, buildings or other supporting structures external to a building.

Note: Cabling that is supported along its length by a fixed, solid support such as a beam or girder between buildings is treated as outdoor surface cabling.

3.1.3 building

a substantial structure with a roof and walls, and includes, but is not limited to, a high-rise building, block of flats/apartments, factory, house, shed, caravan and mobile home.

3.1.4 Building Code

the Building Code of Australia (BCA), as varied and enacted in the relevant State or Territory.

3.1.5 building entry point

a point at which a line that is used to provide a carriage service to an end-user in a building meets the outer surface of that building, immediately before entering the building. [Telecommunications Act 1997]

3.1.6 cable

an assembly of one or more cable units (e.g. pairs, quads, coaxial tubes, fibres, etc.) in an overall sheath.

Note: The assembly may include such things as a shield, moisture barrier, filling compound, strengthener or bearer wire.

- 3.1.7 cabling
cable or cables and any associated works or parts such as trenching, pits, poles, conduits, trays, connecting devices, jumpers, etc.
- 3.1.8 cabling product
a passive device (including any cable, connecting hardware or surge suppression device) that is intended for use on the customer side of the network boundary.
- 3.1.9 cabling provider
a person who performs or supervises cabling work.
- 3.1.10 Cabling Provider Rules
the Telecommunications *Cabling Provider Rules 2000*, as amended from time to time.
- 3.1.11 cabling work
(a) the installation of customer cabling for connection to a telecommunications network or to a facility; or
(b) the connection of customer cabling to a telecommunications network or to a facility; or
(c) the maintenance of customer cabling connected to a telecommunications network or to a facility.

[*Telecommunications Act 1997*]

Note: The installation of cord or cordage as fixed or concealed cabling is cabling work and is subject to the requirements of this Standard. Refer to Clause 1.1.
- 3.1.12 carriage service
a service for carrying communications by means of guided and/or unguided electromagnetic energy. [*Telecommunications Act 1997*]
- 3.1.13 carriage service provider
a person who supplies, or proposes to supply, a listed carriage service to the public using:
(a) a network unit owned by one or more carriers; or
(b) a network unit in relation to which a nominated carrier declaration is in force [*Telecommunications Act 1997*]
- 3.1.14 carrier
the holder of a carrier licence. [*Telecommunications Act 1997*]

- 3.1.15 catenary support system
a suspension system, typically a wire rope, between two points to provide support for cables.
- 3.1.16 Certified Components List (CCL)
a list that was established by AUSTEL and that is published by ACMA on its website.
- Note 1: AUSTEL and the Spectrum Management Agency merged in the creation of the Australian Communications Authority (ACA) on 1 July 1997. The ACA and the Australian Broadcasting Authority (ABA) merged in the creation of the Australian Communications and Media Authority (ACMA) on 1 July 2005.
- Note 2: The maintenance of the CCL was discontinued on 1 July 1997, but the CCL remains in force in accordance with ACA TS 102-1998 *Telecommunications Technical Standard (Customer Equipment and Customer Cabling)*.
- 3.1.17 Communications Earth System (CES)
a system of earthing using common elements to provide for earthing of electrical and communications equipment within a premises.
- Note: A CES may be used for protective and functional earthing for telecommunications purposes.
- 3.1.18 Communications Earth Terminal (CET)
a terminal provided for the purpose of equipotential bonding of the CES or the TRC to the main earthing bar, main earthing conductor or sub-main earthing conductor of the electrical installation.
- Note: The CET provides a demarcation between the electrical earthing system and the telecommunications earthing system and was formerly known as a 'bonding terminal'.
- 3.1.19 compliant
labelled in accordance with the *Telecommunications Labelling Notice*.
- 3.1.20 conductive pole or structure
a pole or structure that has a low electrical resistance.
- Note: Any metallic, reinforced concrete or fibre-cement pole or structure is deemed to be conductive.
- 3.1.21 conduit
a tube or pipe that physically accommodates cables.
- Note: In this Standard, conduit and pipe have the same meaning (see also 'duct' and 'trunking').

3.1.22 connected

in relation to:

- (a) a telecommunications network; or
- (b) a facility; or
- (c) customer cabling; or
- (d) customer equipment;

includes connection otherwise than by means of physical contact, for example, a connection by means of radiocommunication.

[Telecommunications Act 1997]

3.1.23 cord

a flexible cable with a minimum of one termination (e.g. on a plug).

Note: Cords are used for connection of moveable customer equipment or to afford flexibility, e.g. includes patch cords, fly leads and pigtails.

3.1.24 cordage

a flexible cable that is not fitted with connectors, which may be used in the assembly of cords.

3.1.25 cross-connection

a method of providing for flexible interconnection of cabling elements, primarily by means of patch cords or jumpers.

3.1.26 Customer Access Equipment (CAE)

customer equipment with multiple ports (local or network) that provides access (gateway functions) to a telecommunications network and is capable of switching, storage, processing, conversion, integration, line isolation/coupling or multiplexing of analogue or digital voice or voice equivalent communication.

[AS/ACIF S003:2005]

Note 1: Examples of CAE include, but are not limited to, PABX or key systems, line isolators, ISDN terminal adapters, echo cancellers, interactive voice response systems, voice/packet gateway, integrated access devices and voice messaging systems.

Note 2: CAE is a type of customer equipment but, for the purposes of this Standard, is not considered to be 'terminal equipment'. An operator console, telephone handset or any other peripheral device connected to CAE that may be regularly handled by an end-user is 'terminal equipment'.

Note 3: CAE was formerly referred to as a CSS (customer switching system).

3.1.27 customer cabling

a line that is used, installed ready for use or intended for use on the customer side of the boundary of a telecommunications network.

[Telecommunications Act 1997]

3.1.28 customer equipment

- (a) any equipment, apparatus, tower, mast, antenna or other structure or thing that is used, installed ready for use or intended for use on the customer side of the boundary of a telecommunications network; or
- (b) any system (whether software-based or otherwise) that is used, installed ready for use or intended for use on the customer side of the boundary of a telecommunications network;

but not including a line. [Telecommunications Act 1997]

Note: See also 'terminal equipment'.

3.1.29 damp location

a location that is continuously or frequently exposed to splashing, spraying, hosing, ice, steam or water condensation but does not include a location exposed to the weather.

Note 1: An example of a damp location may include, but is not limited to, a room or area within a building used for hosing down operations or containing a bath, shower, washing tub, washing basin, spa, swimming pool, sauna, urinal, fountain, water feature or refrigeration.

Note 2: A damp location does not include a domestic kitchen, a domestic WC, a building cavity (including any roof or underfloor space) or floor duct.

3.1.30 designated distributor

a distributor, near the main or first electrical switchboard in the building, designated by the cabling provider as the most appropriate distributor for distribution of a TRC system.

Note 1: The designated distributor may or may not be an MDF.

Note 2: The designated distributor was formerly called the 'nominated distributor'.

3.1.31 differential earth clamp

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

3.1.32 distributor

a collection of components used to terminate cables and which provides for cross-connection of lines.

Note 1: An example of a distributor is a jumperable distribution frame or a patch panel.

Note 2: Where cable termination equipment is used to interconnect two or more cables without cross-connection, for the purposes of this Standard it is not regarded as a distributor.

3.1.33 duct

a closed passage for housing and protecting cables and conductors.

Note 1: A duct may consist of a conduit, rectangular tubing or construction materials, e.g. a channel formed in concrete with a permanent concrete, metal or plastic covering.

Note 2: See also 'conduit' and 'trunking'.

3.1.34 Earth Potential Rise (EPR)

a rise in voltage of an earthing system and the surrounding soil with respect to a distant earth.

Note 1: EPR is caused primarily when an earth fault on an HV power system produces a current flow through the earthing system of an HV site.

Note 2: See Appendix H for more information about EPR.

3.1.35 electrically conductive element

any internal or external electrically conductive material associated with cable, including, but not limited to, a metallic cable pair, connector, shield, pair separator, bearer, or metallic or carbon fibre strengthener.

3.1.36 enclosure

a housing or covering for cables or equipment providing an appropriate degree of protection against external influences or end-user contact with hazardous voltages, ELV or TNV.

3.1.37 EPR hazard zone

the area around an earthing system bounded by a contour joining all points of EPR equal to the maximum acceptable voltage below which no special precautions need to be taken to protect telecommunication services, cabling providers and end-users.

Note: See Appendix H for more information.

3.1.38 equipotential bonding

special electrical connections intended to bring exposed conductive parts or extraneous conductive parts to the same or approximately the same potential, but not intended to carry current in normal service. [AS/NZS 3000:2000]

Note: In this Standard, the conductor used for equipotential bonding of a telecommunications earthing system to the electrical earthing system is called a 'communications bonding conductor'.

3.1.39 Extra-Low Voltage (ELV)

refer to 'voltage classifications' (Clause 3.1.78) and 'service classifications' (3.1.79)

- 3.1.40 facility
- (a) any part of the infrastructure of a telecommunications network; or
 - (b) any line, equipment, apparatus, tower, mast, antenna, tunnel, duct, hole, pit, pole or other structure or thing used, or for use, in or in connection with a telecommunications network.
[Telecommunications Act 1997]
- 3.1.41 first socket
- a telecommunications outlet within a customer's building which terminates a carrier's lead-in cabling, i.e. there is no intermediate MDF or NTD.
- Note 1: The first socket is a defined network boundary point. Refer to Appendix J for more information about the first socket and the network boundary.
- Note 2: There may be more than one 'first socket' within a building.
- 3.1.42 functional earth
- the earthing of a point in equipment or in a system which is necessary for a purpose other than safety. [AS/NZS 60950.1:2003]
- 3.1.43 hazardous area (explosive atmosphere)
- an area in which an explosive gas atmosphere or dust/air mixture is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of apparatus.
- Note 1: Hazardous areas are classified in accordance with AS/NZS 60079.10, AS/NZS 61241.10 and AS/NZS 2430.3, or in accordance with industry-specific Standards or Codes (e.g. mines or premises where explosives are processed or manufactured).
- Note 2: The responsibility for classification of hazardous areas rests with the owner or occupant of the premises.
- 3.1.44 hazardous service
- refer to 'voltage classifications' (Clause 3.1.78) and 'service classifications' (Clause 3.1.79).
- 3.1.45 hazardous voltage
- refer to 'voltage classifications' (Clause 3.1.78) and 'service classifications' (Clause 3.1.79).
- 3.1.46 High Voltage (HV)
- refer to 'voltage classifications' (Clause 3.1.78) and 'service classifications' (Clause 3.1.79).

- 3.1.47 HV site
any part of an HV power system where power system fault current may flow into the surrounding soil or local earthing system.
Note: Refer to Appendix H for more information about HV power systems.
- 3.1.48 indoor cabling
customer cabling that is installed inside a building but not underground or exposed to the elements.
Note: Cabling installed within a sheltered structure between buildings, such as a service tunnel, covered walkway or above-ground trunking system, is treated as indoor cabling.
- 3.1.49 isolation device
a device that isolates each of the conductors of a telecommunications service to prevent the transfer of hazardous voltages but allows the service to operate normally.
- 3.1.50 jumper
a cable unit or cable element without connectors, typically one to four twisted pairs, either unsheathed or sheathed, used to make a cross-connection within a distributor.
- 3.1.51 lead-in cabling
a carrier's telecommunications network cabling from the carrier's distribution point to the network boundary.
- 3.1.52 limited current circuit
refer to 'voltage classifications' (Clause 3.1.78) and 'service classifications' (Clause 3.1.79).
- 3.1.53 line
a wire, cable, optical fibre, tube, conduit, waveguide or other physical medium used, or for use, as a continuous artificial guide for or in connection with carrying communications by means of guided electromagnetic energy. [Telecommunications Act 1997]
- 3.1.54 Low Frequency Induction (LFI)
the generation of currents in a telecommunications line due to inductive coupling with a power line carrying large unbalanced currents, e.g. during a fault condition on an HV power system.
Note: See Appendix H for more information about LFI.
- 3.1.55 Low Voltage (LV)
refer to 'voltage classifications' (Clause 3.1.78) and 'service classifications' (Clause 3.1.79).

3.1.56 Main Distribution Frame (MDF)

a distributor that provides, or is intended to provide, an electrical termination point for a carrier's lead-in cabling.

Note 1: The MDF is a defined network boundary point. Refer to Appendix J for more information about the MDF and the network boundary.

Note 2: There may be more than one MDF within a building.

3.1.57 network boundary

the point which is deemed to be the boundary of a carrier's telecommunications network for determining whether cabling or equipment is 'customer cabling' or 'customer equipment' for the purpose of technical regulation under Part 21 of the *Telecommunications Act 1997* (the Act).

Note 1: In accordance with Part 21 of the Act, customer cabling and customer equipment must comply with the *Telecommunications Labelling Notice* and cabling work must be performed by a cabling provider.

Note 2: Refer to Appendix J for more information about the network boundary.

3.1.58 Network Termination Device (NTD)

a device meeting the carrier's requirements that is provided by the carrier to establish a demarcation point between the carrier's telecommunications network and customer cabling or customer equipment.

Note 1: An NTD is permanently marked at manufacture with the words 'Network Termination Device' or the letters 'NTD'. Any device that is not so marked is not an NTD.

Note 2: The NTD is a defined network boundary point. Refer to Appendix J for more information about the NTD and the network boundary.

3.1.59 outdoor cabling

customer cabling that is installed external to a building, either underground or exposed to the elements.

Note: Cabling installed within a sheltered structure between buildings, such as a service tunnel, covered walkway or above-ground trunking system, is treated as indoor cabling.

3.1.60 patch cord

a flexible cable unit or cable element with connector(s), used to make a cross-connection within a distributor without the use of a tool.

3.1.61 power feeding

the transfer of electrical power (usually DC) over a telecommunications line for telecommunications purposes to operate a powered device.

- 3.1.62 premises
any land together with its building(s) used as a place of business or residence.
- 3.1.63 protective earth
the earthing of a point in equipment or in a system which is necessary for safety purposes.

Note: A protective earth may be provided by means of a protective earthing conductor, an equipotential bonding conductor to the electrical earthing system, a connection to a CES or via bonding of metallic parts to a protective earth connection.
- 3.1.64 protective earthing conductor
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 earthing system.
[AS/NZS 3000:2000]

Note: A protective earthing conductor is part of the electrical installation and usually needs to be installed by a licensed electrical worker.
- 3.1.65 readily accessible
capable of being reached quickly without climbing over or removing obstructions, mounting upon a chair, or using a movable ladder, and in any case not more than 2 m above the ground, floor or platform. [AS/NZS 3000:2000]
- 3.1.66 restricted access location
a locked room or enclosure where appropriate signage is used to ensure accidental access is not obtained by persons who are not qualified or authorised to gain access.
- 3.1.67 Safety Extra-Low Voltage (SELV) circuit
refer to 'voltage classifications' (Clause 3.1.78) and 'service classifications' (Clause 3.1.79).
- 3.1.68 sub-duct
a conduit installed within a larger conduit, duct or trunking.

Note: Sub-ducting is used to provide physical or electrical separation between a cable installed within the sub-duct and any service installed within the larger conduit, duct or trunking.
- 3.1.69 Telecommunications Functional Earth Electrode (TFEE)
an electrode that provides a connection to the general mass of earth for functional earthing of telecommunications equipment and cabling.

- 3.1.70 Telecommunications Labelling Notice
the *Telecommunications Labelling (Customer Equipment and Cabling) Notice 2001*, as amended from time to time, or a notice made in substitution for that notice.
- 3.1.71 telecommunications network
a system, or series of systems that is operated by a carrier or carriage service provider and which carries, or is capable of carrying, communications by means of guided and/or unguided electromagnetic energy. [Telecommunications Act 1997]
- 3.1.72 Telecommunications Network Voltage (TNV) circuit
refer to 'voltage classifications' (Clause 3.1.78) and 'service classifications' (Clause 3.1.79).
- 3.1.73 Telecommunications Outlet (TO)
a fixed connecting device to which an end-user may connect terminal equipment to telecommunications cabling.

Note 1: A telecommunications outlet typically comprises a wall plate, housing or other mounting device containing a socket or sockets.

Note 2: For the purposes of this Standard, a telecommunications outlet includes a device referred to as a 'broadcast outlet' (BO) or 'control outlet' (CO) in any other telecommunications Standard.
- 3.1.74 Telecommunications Reference Conductor (TRC)
a low noise earthing system providing a zero voltage reference point for telecommunications signalling and other functional purposes which may include equipment reliability.
- 3.1.75 terminal equipment
peripheral equipment operated by the end-user to access a telecommunications service.

Note 1: An example of terminal equipment is a telephone instrument, headset, fax machine, modem or other equipment that may be handled by the customer.

Note 2: Terminal equipment is a type of customer equipment. Equipment such as a distributor or CAE is also customer equipment but is not terminal equipment.
- 3.1.76 trunking
a tray or trough system with removable cover(s) along its length for housing and protecting cables.

Note: See also 'conduit' and 'duct'.

3.1.77 underground cabling

cabling that is installed below ground level external to a building.

Note: Cabling installed within an underground structure such as a service tunnel or mine is treated as indoor cabling.

3.1.78 voltage classifications

3.1.78.1 Extra-Low Voltage (ELV)

a voltage not exceeding 42.4 V peak or 60 V d.c.
[AS/NZS 60950.1:2003]

Note: This definition differs from the ELV definition contained in AS/NZS 3000:2000, which is more closely aligned to the TNV limits described below, i.e. 120 V d.c. or 70.7 V a.c. peak (50 V a.c. r.m.s.).

3.1.78.2 Telecommunications Network Voltage (TNV)

a voltage not exceeding—

(a) when telephone ringing signals are not present—

(i) 71 V peak or 120 V d.c.; or

(ii) if a combination of AC voltage and DC voltage is present, the sum of the AC peak voltage divided by 71 and the DC voltage divided by 120 must not exceed 1; and

(b) when telephone ringing signals are present, voltages such that the signal complies with the criteria of either Clause M.2 or Clause M.3 of AS/NZS 60950.1 (the signal is required to be current limited and cadenced).

Note: Adapted from AS/NZS 60950.1.

3.1.78.3 Low Voltage (LV)

a voltage exceeding ELV limits but not exceeding 1000 V a.c. or 1500 V d.c. [AS/NZS 60950.1:2003]

3.1.78.4 High Voltage (HV)

a voltage exceeding LV limits. [AS/NZS 60950.1:2003]

3.1.78.5 hazardous voltage

a voltage exceeding ELV limits existing in a circuit which does not meet the requirements for either a limited current circuit or a TNV circuit. [AS/NZS 60950.1:2003]

3.1.79 service classifications

3.1.79.1 primary circuit

a circuit which is directly connected to the AC mains supply and includes, for example, the means for connection to the AC mains supply, the primary windings of transformers, motors and other loading devices. [AS/NZS 60950.1:2003]

3.1.79.2 secondary circuit

a circuit which has no direct connection to a primary circuit and derives its power from a transformer, converter or equivalent isolation device, or from a battery. [AS/NZS 60950.1:2003]

3.1.79.3 SELV circuit

a secondary circuit which is so designed and protected that:

- (a) under normal operating conditions, its voltages do not exceed ELV limits at any time; and
- (b) under single fault conditions, its voltages do not exceed ELV limits for longer than 200 ms and, in any case, do not exceed 71 V peak or 120 V d.c. at any time.

Note 1: An example of an SELV circuit is a power feed from a battery or a double insulated 'plug pack'.

Note 2: Adapted from AS/NZS 60950.1:2003.

Note 3: A circuit that meets the above requirements, but which is subject to overvoltages from a telecommunications network or a cable distribution system, is classified as a TNV circuit.

3.1.79.4 ELV circuit

a secondary circuit with voltages between any two conductors of the circuit, and between any one such conductor and earth, not exceeding ELV limits under normal operating conditions, which is separated from hazardous voltage by basic insulation, and which neither meets all of the requirements for an SELV circuit nor meets all of the requirements for a limited current circuit.

[AS/NZS 60950.1:2003]

Note: A hazardous voltage could exist in an ELV circuit under single fault conditions.

3.1.79.5 TNV circuit

a secondary circuit to which the accessible area of contact is limited and that is so designed and protected that:

- (a) under normal operating conditions, the voltages do not exceed TNV limits; and

- (b) under single fault conditions, the voltages do not exceed TNV limits for longer than 200 ms and, in any case, do not exceed 1500 V peak at any time.

Note 1: An example of a TNV circuit is a standard telephone line.

Note 2: Adapted from AS/NZS 60950.1.

Note 3: AS/NZS 60950.1 further classifies TNV circuits as TNV-1, TNV-2 and TNV-3. However, for the purposes of this Standard these sub-classifications are not relevant.

3.1.79.6 limited current circuit

a secondary circuit which is so designed and protected that, under both normal operating conditions and single fault conditions, the current which can be drawn is not hazardous. [AS/NZS 60950.1:2003]

Note 1: For frequencies not exceeding 1 kHz, the steady-state current drawn through a non-inductive resistor of $2000\Omega \pm 10\%$ connected between any two parts of a limited current circuit, or between any such part and earth, should not exceed 0.7 mA peak or 2 mA d.c.

Note 2: For frequencies above 1 kHz, the limit of 0.7 mA is multiplied by the value of the frequency in kHz but should not exceed 70 mA peak.

3.1.79.7 LV telecommunications circuit

a secondary circuit used for telecommunications purposes whose voltages under normal operating conditions or single fault conditions exceed TNV limits but do not exceed LV limits, and which does not meet the requirements for a limited current circuit.

Note 1: An example of an LV telecommunications circuit is a cable of an emergency warning and intercommunication system (EWIS) typically operating at 100 V a.c.

Note 2: An LV telecommunications circuit is a hazardous service and is required to be separated from other telecommunications circuits, LV power and HV circuits in accordance with this Standard.

3.1.79.8 LV power

a primary circuit connecting LV AC mains supply to a building, structure or electrical appliance.

Note: An example of LV power is a 240 V a.c. mains power cable within a building.

3.1.79.9 HV power

a primary circuit connecting HV AC mains supply to a building, structure or electrical equipment.

Note: An example of HV power is an 11 kV a.c. (or higher) mains power cable feeding a large commercial or multi-residential building.

3.1.79.10 HV circuit

any circuit, whether a primary circuit or a secondary circuit, in which the voltages may exceed LV limits under normal operating conditions.

Note: HV power is also an HV circuit.

3.1.79.11 hazardous service

a service that may cause injury to any person or permanent mechanical or electrical damage to telecommunications plant.

Note: Such services include, but are not limited to, the following:

- (a) a pipe containing corrosive or flammable liquid or gas, or any liquid or gas under high pressure;
- (b) a pipe of a temperature in excess of 60° C (this does not include a water pipe at a temperature below 60° C);
- (c) an LV or HV power cable or HV circuit;
- (d) a lightning down-conductor from an air termination; and
- (e) any telecommunications cable that carries a hazardous voltage (such cables are normally special application cables).

3.2 Abbreviations

For the purposes of this document, the following abbreviated terms apply.

AC (or a.c.)	Alternating Current (in r.m.s. value unless stated otherwise)
ACIF	Australian Communications Industry Forum
ACMA	Australian Communications and Media Authority
AS	Australian Standard
C	Celsius
CAE	Customer Access Equipment
CES	Communications Earth System
CET	Communications Earth Terminal
DC (or d.c.)	Direct Current
ELV	Extra-Low Voltage
EPR	Earth Potential Rise
ESAA	Electricity Supply Association of Australia Limited
EWIS	Emergency Warning and Intercommunication System
h	hour(s)
HV	High Voltage
IEC	International Electrotechnical Commission
IP	International Protection (rating) — sometimes also

	referred to as 'ingress protection'
IPXn	rated for protection against ingress of water only (n = 0 to 8, according to the degree of protection specified)
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
kg	kilogram(s)
km	kilometre(s)
kV	kilovolt(s)
LFI	Low Frequency Induction
LV	Low Voltage
m	metre(s)
mA	milliampere(s)
max.	maximum
MDF	Main Distribution Frame
min.	minimum
mm	millimetre(s)
mm ²	square millimetre(s)
NTD	Network Termination Device
NZS	New Zealand Standard
OH&S	Occupational Health and Safety
PABX	Private Automatic Branch eXchange
PVC	PolyVinyl Chloride
s	second(s)
SAA	Standards Association of Australia
SELV	Safety Extra-Low Voltage
SWA	Steel Wire Armouring
SWER	Single Wire Earth Return
TFEE	Telecommunications Functional Earth Electrode
TNV	Telecommunications Network Voltage
TO	Telecommunications Outlet
TRC	Telecommunications Reference Conductor
µA	microampere(s)
ULLS	Unconditioned Local Loop Service
UV	UltraViolet (radiation/light), e.g. direct sunlight
V	Volt(s)

4 GENERAL PRINCIPLES

4.1 Objective

The basic objective of this Standard is to—

- (a) protect the health and safety of any person who may—
 - (i) operate;
 - (ii) work on;
 - (iii) use services supplied by means of; or
 - (iv) be otherwise reasonably likely to be affected by the operation of;

a telecommunications network or a facility; and

- (b) protect the integrity (proper end-to-end functioning) of a telecommunications network or a facility.

Note: A carrier may disconnect customer equipment or customer cabling that is, or is likely to be, a threat to the health or safety of any person or the integrity of a telecommunications network or a facility.

4.2 Categories of requirements

This Standard contains normative and informative elements. Normative elements (mandatory requirements) are indicated by the words '**shall**' or '**shall not**'.

All other elements are informative.

4.3 Units and symbols

In this Standard the International System (SI) of units and symbols is used in accordance with Australian Standard AS ISO 1000.

4.4 Health and safety

4.4.1 Safety of the installation

In the performance of any cabling work, in general the cabling provider should ensure that—

- (a) end-users are protected from personal electrical contact with any voltage/service other than SELV and from any exposure to laser radiation (see Note 1);
- (b) cabling providers are protected from accidental personal electrical contact with LV telecommunications circuits, LV power and HV circuits or accidental exposure to hazardous laser radiation;

- (c) cabling providers who are required to access, install or maintain LV telecommunications circuits, are protected from accidental personal electrical contact with LV power and HV circuits;
- (d) licensed electrical workers are protected from accidental personal electrical contact with any telecommunications circuits or accidental exposure to hazardous laser radiation; and
- (e) the creation of any general safety hazard is avoided, e.g. tripping, falling or bodily impact with a protruding object.

Note 1: End-users are all persons other than persons performing cabling work, including persons who do not actually use the telecommunications service (e.g. casual visitors, cleaners). End-user contact with SELV circuits should be prevented where practicable.

Note 2: Provision is made in this Standard for cabling providers who are suitably qualified or licensed to access LV telecommunications circuits, LV power or HV circuits.

4.4.2

Occupational Health and Safety (OH&S) requirements

Cabling providers should comply with relevant Commonwealth, State and Territory OH&S requirements including, but not limited to, Building Code requirements.

4.5

Network integrity

To ensure electromagnetic compatibility (EMC) and interoperability of the customer cabling with telecommunications networks, and to minimise the risk of crosstalk between telecommunications circuits, in addition to the requirements of this Standard customer cabling should be installed in accordance with the following Standards, where relevant:

- (a) Generic cabling for commercial premises — AS/NZS 3080.
- (b) Pathways and spaces for commercial buildings — AS/NZS 3084.
- (c) Generic cabling for homes — AS/NZS ISO/IEC 15018.
- (d) Optical fibre cabling — AS/NZS 2211.1, AS/NZS 2211.2 and AS/NZS 3080.
- (e) Coaxial cabling — AS/NZS 1367.

Note: A carrier's specific requirements may also need to be taken into account, for example—

- (a) at the network interface (network boundary);
- (b) for coaxial cabling used to supply subscription TV ('pay TV') or broadband data services; or
- (c) for fibre-to-the-premises (FTTP) cabling.

4.6 Cabling provider competency standards

To ensure that the safety and network integrity of the installation is maintained, in addition to the mandatory cabling provider registration requirements, it is recommended that the cabling provider meet appropriate competency standards for installation and repair work in each of the following categories, where relevant to the work being done:

- (a) Structured, balanced (twisted pair) cabling.
- (b) Optical fibre cabling.
- (c) Coaxial cabling.
- (d) Underground cabling.
- (e) Aerial cabling.
- (f) Fire detection and alarm systems.
- (g) Lifts, escalators and moving walks.
- (h) Intruder alarm systems.
- (i) Building control and automation systems.

5 GENERAL REQUIREMENTS

5.1 Safe and sound practice

Customer cabling **shall** be installed in accordance with principles of safe and sound practice.

Note 1: An example of practices that are not considered to be safe are those that may inevitably lead to the injury of a cabling provider or any other person, such as:

- (a) visible markings that are misleading, e.g. the use of conduit, trunking or ducting marked 'ELECTRICAL' for enclosure of telecommunications cable; or
- (b) physical protrusions in trafficable areas that a person may bump into or trip over (e.g. due to their location or low visibility).

Note 2: An example of practices that are not considered to be sound are those that may breach another industry Standard or Code.

5.2 Manufacturer's instructions

Cable and other cabling equipment installed for connection to a carrier's telecommunications network **shall** be installed in accordance with the manufacturer's instructions, including, in the case of cable, such things as cable bend radius, tension, cable tie pressure, colour code, etc.

5.3 Compliance labelling

A cabling provider **shall not** install any customer cabling or customer equipment that is subject to a standard under the *Telecommunications Act 1997* unless it is labelled in accordance with the *Telecommunications Labelling Notice*.

Note: Earthing and telecommunications power distribution components (e.g. earthing/power conductors, earthing bars, busbars, earthing/power terminals, line tap devices, earth electrodes and associated fittings, batteries, fuses and circuit breakers) are not required to comply with the *Telecommunications Labelling Notice*.

5.4 Protection against damage

All parts of an installation **shall** be adequately protected against damage which might reasonably be expected to result from mechanical injury, exposure to weather, water or excessive dampness, corrosive fumes, accumulation of dust, steam, oil, high temperature, or any other circumstance to which they will be exposed under the conditions of their use.

5.5 Proper use

A cabling product **shall** be fit for purpose for its intended use.

5.6 Cables used for LV telecommunications circuits

Any cable used for an LV telecommunications circuit **shall** be—

- (a) clearly identifiable at any access point; and
- (b) separated from other services and telecommunications circuits in accordance with Section 9.

5.7 Cable with red sheath

Cable with a red sheath should only be used for cabling associated with a fire detection and fire alarm system.

Note: Before altering or disconnecting any cable with a red sheath, the cabling provider should check whether it is associated with a fire detection and fire alarm system and treat it accordingly.

5.8 Cable joints

5.8.1 Jointing method

A joint in a cable **shall** be made by one of the following means:

- (a) For all types of cables, using suitable connectors, joiners, compression fittings or other compliant devices.
- (b) For twisted pair cable, by twisting and soldering of conductors.
- (c) For optical fibre cable, by fusion splicing.

Note: Joints in cables may reduce the performance of the cabling system.

5.8.2 Physical protection of the joint

The cable joint **shall** be suitably constructed, enclosed, positioned, and supported to prevent the ingress of dust or moisture.

5.9 Cable terminations

5.9.1 Access to cable terminations

All telecommunications terminations **shall** be enclosed or located to prevent unintentional contact with ELV, TNV, limited current or LV telecommunications circuits by a person who is not doing cabling work.

Note 1: It is permissible to allow end-users (e.g. customers) to come into personal contact with SELV circuits although this should be prevented where practicable.

Note 2: LV telecommunications circuits should only be accessible by suitably qualified persons.

5.9.2 Separation from other services

All telecommunications terminations **shall** be separated from the cable terminations of other services in accordance with Section 9.

5.10 Hazardous voltages

Customer cabling **shall not** be used to carry a hazardous voltage except where otherwise allowed in this Standard.

Note: 'Hazardous voltage' is defined in Section 3.

5.11 Interference to other circuits

Any communications or power feeding circuit carried in customer cabling with any carriage service **shall** comply with the requirements of AS/ACIF S006 or AS/ACIF S043, whichever is applicable, whether or not the communications or power feeding circuit is connected to a telecommunications network.

5.12 Alterations and additions

Every addition to, or alteration of, an existing installation **shall** comply with the relevant requirements of this Standard.

5.13 Tampering or interference with a carrier facility

A carrier's lead-in cabling or network boundary facilities **shall not** be moved, removed or altered without the prior written authorisation of the carrier.

Note: If a carrier publishes a document authorising cabling providers to alter its facilities, for the purpose of this clause such a document will be taken to be the prior written authorisation of the carrier as long as any terms and conditions set out in the document are adhered to by the cabling provider.

5.14 Defective customer cabling or customer equipment not to be reconnected

A cabling provider **shall not** reconnect any cabling, equipment or line that has been disconnected by the carrier pursuant to section 446 or section 447 of the *Telecommunications Act 1997* (the Act).

Note: Sections 446 and 447 of the Act empower a carrier to disconnect customer cabling or customer equipment if the carrier has an honest belief that the cabling or equipment is, or is likely to be, a threat to the health or safety of persons or to the integrity of the carrier's telecommunications network or a facility.

6 HAZARDOUS CONDITIONS ASSOCIATED WITH HV POWER

6.1 Earth potential rise (EPR)

6.1.1 General

Customer equipment, distributors and other connecting hardware, earthed surge suppression devices, telecommunications electrodes, pits, access holes, or cable joints that are associated with any cable that contains electrically conductive elements, **shall not** be placed in a location where the EPR may exceed 430 V a.c. under power system fault conditions, except as part of an engineered solution in accordance with Clause 6.1.3.

Note 1: If a building is only supplied by 240 V a.c. single phase power or 415 V a.c. three phase power, there will be no need to consider EPR unless the proposed installation is within the EPR hazard zone of an HV site, as determined in the document described in Clause 6.1.3.

Note 2: Appendix H provides more information about EPR including recommended minimum clearances from certain HV equipment.

6.1.2 HV sites of particular concern

The cabling provider **shall** check with the power utility as to the extent of the EPR hazard zone at an HV site where customer cabling or customer equipment is to be installed—

- (a) in or near a power generating station or power substation;
- (b) near an HV transformer or SWER transformer; or
- (c) in or near any HV site located in an area of high soil resistivity (e.g. rocky or dry, sandy terrain).

6.1.3 Engineered installation

Where an installation cannot be placed in a location where the EPR hazard is less than 430 V a.c., the installation **shall not** proceed unless on the basis of a design certified by a qualified electrical engineer as complying with the principles of the jointly agreed ESAA and Telecom Australia (Telstra) *Code of Practice for the Protection of Personnel and Equipment against Earth Potential Rises caused by High Voltage Power Systems Faults*.

Note 1: At the time of publication, Standards Australia was finalising for publication 'Earth potential rise (EPR) – Coordination of power and telecommunications systems' (to be AS/NZS 3835).

Note 2: A useful reference is SAA HB 100 (CJC 4).

6.1.4 Carrier notification

The relevant carrier **shall** be notified in writing of an installation proposed under the conditions of Clause 6.1.3 before the installation proceeds.

6.2 Low frequency induction (LFI)

6.2.1 General

Customer cables that contain electrically conductive elements **shall not** be installed in the vicinity of an HV power line where the 50 Hz induced voltages under a phase-to-earth fault condition on the power line may exceed 430 V a.c. in the customer cabling, except as part of an engineered solution in accordance with Clause 6.2.2.

Note: More information about LFI is provided in Appendix H.

6.2.2 Engineered installation

Where the level of induction may exceed the limit specified in Clause 6.2.1, the installation **shall not** proceed unless on the basis of a design certified by a qualified electrical engineer as complying with the principles of SAA HB 101 (CJC 5) and SAA HB 102 (CJC 6).

Note: Another useful reference is SAA HB 100 (CJC 4).

6.2.3 Carrier notification

The relevant carrier **shall** be notified in writing of an installation proposed under the conditions of Clause 6.2.2 before the installation proceeds.