

AS/NZS 3084:2017
(Incorporating Amendment No. 1)



Australian/New Zealand Standard™

Telecommunications installations — Telecommunications pathways and spaces for commercial buildings



AS/NZS 3084:2017

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee CT-001, Communications Cabling for Commercial Buildings. It was approved on behalf of the Council of Standards Australia on 11 January 2017 and by the New Zealand Standards Approval Board on 13 December 2016.

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- Australian Communications and Media Authority
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- Communications Alliance
- Energy Networks Association
- Engineers Australia
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- KNX National Group
- Lighting Council Australia
- National Electrical and Communications Association
- Telecommunications Users Association of New Zealand

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Australian/New Zealand Standard™

Telecommunications installations — Telecommunications pathways and spaces for commercial buildings

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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CT-001, Communications Cabling for Commercial Buildings, to supersede AS/NZS 3084:2003, *Telecommunications installations—Telecommunications pathways and spaces for commercial buildings (ISO/IEC 18010:2002, MOD)*. It is a complementary document to AS/NZS ISO/IEC 14763.2:2014 which replaced the content reproduced from ISO/IEC 18010:2002 and ISO/IEC 18010:2002 Amendment 1:2005 that was included in AS/NZS 3084:2003 (incorporating Amendment 1:2007).

A₁ This Standard incorporates Amendment No. 1 (February 2023). The start and end of changes introduced by the Amendment are indicated in the text by tags including the Amendment number 1. **A₁**

The objective of this Standard is to provide specific guidance to architects, planners, designers, engineers, builders, installers, maintenance personnel, building owners, managers and users in the planning and installation of physical pathways and spaces in and between buildings to accommodate the equipment and cabling infrastructure necessary for communications; to the extent that this is not adequately covered for Australian and New Zealand purposes in AS/NZS ISO/IEC 14763.2:2014.

In New Zealand, all references to any and all Australian documents need to be considered informative only where no equivalent New Zealand Standard is noted.

In conjunction with AS/NZS ISO/IEC 14763.2:2014, this Standard provides design procedures and construction practices which can be referenced in project specific construction contract documents created by (or for) Australian and New Zealand users of this document. The information has been significantly expanded and updated from AS/NZS 3084:2003.

The first version, AS 3084—1993, was developed from EIA/TIA-569-A, Commercial Building Standard for Telecommunications Pathways and Spaces. This USA Standard was developed with the support of the American Institute of Architects and the Construction Specifications Institute, since it influences both the design and construction of commercial buildings, where various building components are to be structured into facilities which are responsive to telecommunications needs.

[Appendix A](#) provides guidelines and practical examples for some of the topics covered in the body of this Standard. The material in [Appendix A](#) has been updated from Appendix ZC in AS/NZS 3084:2003.

It should be noted that this Standard has a special relationship to AS/NZS 3080, *Telecommunications installations—Integrated communications cabling systems for commercial premises*. It recognizes that both building cabling and architectural provisions of the building into which such cabling systems are installed need to be standardized.

In Australia a complementary document to this Standard is AS/CA S009, which details mandatory installation requirements for customer cabling in Australia where installations are to be connected to telecommunications carrier networks. Although compliance with AS/CA S009 is not a regulatory requirement in New Zealand, it is indicative of good practice, and compliance with AS/CA S009 may be mandatory if it is referenced in contracts for customer cabling works.

AS/NZS 3000, Electrical installations (known as the Australian/New Zealand wiring rules) contains further general requirements for cabling pathways within buildings. In Australia only, AS/CA S008, Requirements for authorised cabling products, and AS/CA S009 Installation requirements for customer cabling (Wiring rules) provide mandatory requirements for telecommunications cabling products, including telecommunications conduit and pits and aerial cabling.

Some of the figures in this Standard are reproduced by courtesy of the following organizations:

Endeavour Energy (previously Prospect Electricity):

[Figure 7.1](#)

Telstra Corporation:

[Figures 9.5, 9.6, 9.7, 9.8](#)

The term ‘informative’ has been used in this Standard to define the application of the appendices to which it applies. An ‘informative’ appendix is only for information and guidance.

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Foreword

The telecommunications infrastructure is an integral part of building design. It may include voice, data, environmental control, security, audio, television, sensing, alarms, paging, extra-low voltage signal systems and other low voltage and power-limited signal systems. These systems are subject to frequent changes. Design of the pathways and spaces should accommodate this dynamic behaviour. This Standard may significantly influence the design of other building services, such as electrical power and heating, ventilation and air conditioning (HVAC) by virtue of sharing building spaces with those services, and also by requiring power and HVAC to service telecommunications and equipment rooms.

Australian/New Zealand Standard

Telecommunications installations — Telecommunications pathways and spaces for commercial buildings

Section 1 Scope and general

1.1 Scope

This Standard provides specific guidance to architects, planners, designers, engineers, builders, installers, maintenance personnel, building owners, managers and users in the planning and installation of physical pathways and spaces in and between buildings to accommodate the equipment and cabling infrastructure necessary for communications; to the extent that this is not adequately covered for Australian and New Zealand purposes in AS/NZS ISO/IEC 14763.2:2014.

1.2 Application

1.2.1 General

This Standard applies to all types of commercial, government and public buildings located within a property boundary. It should also be applied to buildings and campus pathways on industrial, mining and transport sites and multi-dwelling residential and hospitality premises. It is intended to assist architects, planners, designers, engineers, builders, installers, maintenance personnel, building owners, managers and users in the planning of physical pathways and spaces in and between buildings to accommodate the equipment and cabling infrastructure necessary for telecommunications networks and related information, security, life safety, radio frequency, audio visual, control and building management systems.

Although it may provide a useful reference, this Standard does NOT explicitly apply to pathways and spaces—

- (a) outside property boundaries and in public streets or public land, whether installed or operated by private network owners, developers or carriers; and
- (b) within and around industrial process and utility plant and structures.

Adherence to this Standard will facilitate, by standardizing the approach, the provisioning and maintenance of the comprehensive communications facilities and networks which are in ever-increasing demand, particularly by occupiers of commercial premises.

1.2.2 Choice of design options

This Standard and AS/NZS ISO/IEC 14763.2 do not make specific recommendations among the design options available for telecommunications pathways. For example, the choice between an access floor versus ceiling distribution solution is not delineated. It is up to the telecommunications designer to properly select among the options based upon the applications at hand and the constraints imposed by the building or site design, developer or owner, and tenant.

1.2.3 Australia—Application context

In Australia the requirements of AS/CA S008 and AS/CA S009, AS/NZS 3000 and the National Construction Code (NCC) shall be met notwithstanding anything contained in this Standard. AS/CA S008 contains requirements for manufacture or assembly of telecommunications products such as conduit, cable distribution devices, cables, underground pits and outdoor pillars and cabinets. AS/CA S009 contains requirements for the installation of telecommunications cabling including distributors, enclosures, conduit/tray/duct systems, segregation from other building services, underground and aerial cabling, entrance facilities, and earthing and bonding of equipment and metallic parts. The NCC

contains minimum requirements for pathways and spaces in relation to preventing the spread of fire and for achieving earthquake resilience.

1.2.4 New Zealand—Application context

The cabling regulatory environment in New Zealand differs from that in Australia and there are no equivalent documents to the AS/CA Standards. In New Zealand, AS/CA S008 and AS/CA S009 should be used as a source of guidance only as they do not reflect New Zealand law. Other regulations such as the New Zealand Building Code and AS/NZS 3000 shall be complied with.

1.3 Referenced and related documents

1.3.1 Referenced documents

The following documents are referred to in this Standard:

AS 1170.4, *Structural design actions, Part 4: Earthquake actions in Australia*

AS 1345, *Identification of the contents of pipes, conduits and ducts*

AS 1530.4, *Methods for fire tests on building materials, components and structures, Part 4: Fire-resistance tests for elements of construction*

AS 2118, *Automatic fire sprinkler systems (series)*

AS 2834, *Computer accommodation*

AS 2865, *Confined spaces*

AS 3011.1, *Electrical installations—Secondary batteries installed in buildings, Part 1: Vented cells*

AS 3011.2, *Electrical installations—Secondary batteries installed in buildings, Part 2: Sealed cells*

AS 3996, *Access covers and grates*

AS 4070, *Recommended practices for protection of low-voltage electrical installations and equipment in MEN systems from transient overvoltages*

AS/NZS 1477, *PVC pipes and fittings for pressure applications*

AS/NZS 1768, *Lightning protection*

AS/NZS 2032, *Installation of PVC pipe systems*

AS/NZS 2033, *Installation of polyethylene pipe systems*

AS/NZS 2053, *Conduits and fittings for electrical installations (series)*

AS/NZS 2293.1, *Emergency escape lighting and exit signs for buildings, Part 1: System design, installation and operation*

AS/NZS 2566.2, *Buried flexible pipelines, Part 2: Installation*

AS/NZS 2648.1, *Underground marking tape, Part 1: Non-detectable tape*

AS/NZS 3000, *Electrical installations (known as the Australian/New Zealand wiring rules)*

AS/NZS 3080, *Information technology—Generic cabling for customer premises (ISO/IEC 11801:2011, MOD)*

AS/NZS 3085.1, *Telecommunications installations—Administration of communications cabling systems, Part 1: Basic requirements*

AS/NZS 3835.1, *Earth potential rise—Protection of telecommunications network users, personnel and plant, Part 1: Code of practice*

AS/NZS 3835.2, *Earth potential rise—Protection of telecommunications network users, personnel and plant, Part 2: Application guide*

AS/NZS 4130, *Polyethylene (PE) pipes for pressure applications*

AS/NZS 5070.1, *Siting and operation of radiocommunications facilities, Part 1: General guidelines for fixed, mobile and broadcasting facilities including fixed location satellite earth stations independent of the operating frequency*

AS/NZS 5070.2, *Siting and operation of radiocommunications facilities, Part 2: Guidelines for siting of radiocommunications facilities: VHF, UHF and SHF*

AS/NZS 60079.10, *Explosive Atmospheres, Part 10: Classification of areas*

AS/NZS 60079.10.1, *Explosive Atmospheres, Part 10.1: Explosive gas atmospheres (IEC 60079-10-1, Ed.1.0 (2008) MOD)*

AS/NZS 60079.10.2, *Explosive Atmospheres, Part 10.2: Combustible dust atmospheres*

AS/NZS 60079.14, *Explosive Atmospheres, Part 14: Electrical installations design, selection and erection (IEC 60079-14, Ed.4.0 (2007) MOD)*

AS/NZS 61386, *Conduit systems for cable management (series)*

AS/NZS ISO/IEC 14763.2, *Information technology—Implementation and operation of customer premises cabling, Part 2: Planning and installation*

AS/CA S008, *Requirements for customer cabling products*

AS/CA S009, *Installation requirements for customer cabling (Wiring rules)*

ABCB, National Construction Code of Australia (NCC, incorporates the BCA)

AIRAH, DA09—Load Estimation and Psychrometrics

ARPANSA, Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields—3 kHz to 300 GHz (2002)

ASTT, Australasian Society for Trenchless Technology Document No: CPJP8029-STD-C-001 Standard for Horizontal Directional Drilling

CA, Communications Alliance Industry Code: C564 Mobile Phone Base Station Deployment

PIPA, Plastics Industry Pipe Association of Australia Limited Industry Guidelines: POP001 Electrofusion Jointing of PE Pipes and Fittings for Pressure Applications

Telecommunications Act 1997 (Cth)

Telecordia GR-63 NEBS™ (Network Equipment - Building System) Requirements: Physical Protection

1.3.2 New Zealand equivalent documents

Australian Document	New Zealand Equivalent
AS 1170.4	NZS 1170.5
AS 1345	NZS 5807
AS 1530.4	No equivalent
AS 2834	No equivalent



Documents

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AS 2865	No equivalent. The Department of Labour recommends the use of AS 2865.
AS 3011	No equivalent
AS 3996	No equivalent
AS 4070	No equivalent
AS/CA S008	No equivalent
AS/CA S009	No equivalent
National Construction Code (NCC)	New Zealand Building Code
ARPANSA Radiation Protection Standard	NZS 2772.1
AIRAH DA09	No equivalent (but can infer from NIWA weather data)

1.4 Definitions

For the purpose of this Standard, the definitions given in AS/NZS 3080, AS/NZS ISO/IEC 14763.2, AS/CA S008, AS/CA S009 and those below apply.

1.4.1

access floor

System consisting of completely removable and interchangeable floor panels that are supported on pedestals or stringers (or both) to allow access to the area beneath.

1.4.2

access hole

Termed a 'Maintenance hole' in AS/NZS ISO/IEC 14763.2. A chamber permitting access to otherwise inaccessible (e.g. underground) cabling and joints. Formerly called a 'manhole'.

1.4.3

aerial facility

Component of the building entrance facility consisting of poles, cable-support strand and support system.

1.4.4

alternate entrance

Supplementary building entrance facility into a building using a different routing to provide diversity of building entrance facilities for assurance of service continuity.

1.4.5

antenna entrance

Pathway facility from the antenna to the associated equipment.

1.4.6

bend

A large-radius curved member in conduit, tray or trunking (an elbow, i.e. a sharp 90° change of direction, is not considered a bend).

1.4.7

bonding

The permanent jointing of metallic parts into an electrically conductive path in a manner which assures electrical continuity.

1.4.8**building pathway**

Pathway facility for interconnecting telecommunications entrance rooms, equipment rooms, and telecommunications rooms within a building.

1.4.9**bund**

An embankment, a raised surround.

1.4.10**cable ducting system**

A system of closed enclosures of non-circular section, for insulated conductors, cables and cords in electrical or telecommunications installations, allowing them to be drawn in and replaced.

1.4.11**cable trunking system**

A system of closed enclosures comprising a base with a removable cover, intended for the complete surrounding of insulated conductors, cables, cords and/or for the accommodation of other electrical or telecommunications accessories.

1.4.12**campus pathway**

Pathway facility for interconnecting telecommunications entrance rooms or spaces of different buildings, as in a campus environment, as well as to the property line for connection off the premises.

1.4.13**carrier**

A provider of public telecommunications carriage services as defined in the Australian 'Telecommunications Act 1997' as amended to date. Otherwise referred to internationally and in AS/NZS ISO/IEC 14763.2 as an 'access network provider' or 'external service provider'.

1.4.14**common equipment room (telecommunications)**

Enclosed space used for equipment and backbone interconnections for more than one tenant in a building.

1.4.15**common telecommunications room**

Enclosed space used for backbone interconnections for more than one tenant in a building, which may also house equipment.

1.4.16**customer premises**

Land and/or buildings which contain customer owned or operated equipment connected to a public access provider's network boundary. In Australia, refer to AS/CA S009 definitions of 'customer equipment' and 'premises' for more details.

1.4.17**device**

As related to a work area, a device is an item such as a telephone, personal computer or a graphic or video terminal.

1.4.18**directly buried cable**

Cable installed under the surface of the ground in direct contact with the soil.

1.4.19**draw-box**

Termed a 'pull box' in the referenced AS/NZS ISO/IEC 14763.2. An enclosure providing access to the pathway (generally a conduit or part of a cable ducting system) to feed or draw ('pull') cable in.

1.4.20**draw-wire**

Cord or wire placed within a pathway and used to pull wire and cable through it.

1.4.21**duct**

A single enclosed channel for wires or cables. (In the context of HVAC, it may also be an enclosure in which air is moved forming part of the HVAC system of a building.)

1.4.22**earth electrode**

Refer to AS/NZS ISO/IEC 14763.2.

1.4.23**entrance point (telecommunications)**

Point of emergence for telecommunications cabling through an exterior wall, a floor, or from a conduit.

1.4.24**feeder ducting**

Cable ducting placed within the floor to consolidate cables from the distribution ducting to the telecommunications room. (Equivalent to the USA term 'header ducting'.)

1.4.25**firestop**

A material device or assembly of parts installed in a cable system in a fire-rated wall, floor or ceiling to prevent passage of flame, smoke or gases through the rated barrier (e.g. between compartments).

1.4.26**floor slab**

The upper part of a reinforced concrete floor which is either—

- (a) carried on beams below; or
- (b) laid on the ground with footings.

1.4.27**hand hole**

Referred to as a 'pit' in AS/CA S008 and AS/CA S009 and throughout AS/NZS 3084. Refer to AS/NZS ISO/IEC 14763.2.

1.4.28**infrastructure (telecommunications)**

Collection of those telecommunications components, excluding active equipment, that together provides the basic support for the distribution of all information within a building or campus.

1.4.29**inner duct**

Duct placed within a duct of larger cross section.

Note 1 to entry: Also known as subduct.

1.4.30**main terminal space**

Location of the cross-connect point of incoming cables from the telecommunications external network and the premises cable system.

1.4.31**maintenance hole**

Termed an 'access hole' in Australian usage (previously 'manhole') and throughout AS/NZS 3084. Refer to AS/NZS ISO/IEC 14763.2.

1.4.32**monolithic pour**

The single continuous pouring of a concrete floor and columns of any given floor of a building structure.

1.4.33**open office furniture system**

Contiguous group(s) of work areas, typically including space divisions, work surfaces, storage and seating within an open office environment

Note 1 to entry: The space divisions, also known as partitions, often contain pathways for telecommunications cabling and power wiring.

1.4.34**pathway**

Facility for the placement of telecommunications cable.

1.4.35**penetration**

An un-lined or random opening through a fire resistant floor, wall or ceiling structure to permit the installation of electrical or communications cables.

1.4.36**pit**

Termed a 'hand hole' in AS/NZS ISO/IEC 14763.2 to facilitate cable hauling and defined as such in that standard. In AS/NZS 3084 pit sizes may be large enough to permit splices and joints within them.

1.4.37**plenum**

Compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.

1.4.38**riser**

A vertical pathway for building backbone cabling.

1.4.39**service pole**

May also be called a 'service column'. Enclosed pathway, single or multi-channelled, usually comprising body and removable cover extending from the ceiling to furniture or to the floor, that forms a pathway for electrical wiring or telecommunications cable, or both.

Note 1 to entry: It may also be used to mount or contain connecting hardware.

1.4.40**slab on grade**

Concrete floor placed directly on soil without a basement, crawl space or undercroft.

1.4.41**sleeve**

A lined penetration, often circular, through the wall, ceiling or floor to allow the passage of cables. The lining extends into the space outside the penetration.

1.4.42**slot**

A rectangular penetration.

1.4.43**space (telecommunications)**

Refer to AS/NZS ISO/IEC 14763.2.

1.4.44**splice**

A joining of metallic conductors or optical fibre strands, generally from separate sheaths.

1.4.45**splice box**

A box located in a pathway run intended to house a cable splice.

1.4.46**standby power**

A stand-alone electrical supply source not dependent upon the primary electrical source.

1.4.47**suspended ceiling**

Ceiling that creates an area or space between ceiling material and the structure (or 'soffit') above.

1.4.48**trough**

An open topped pathway for the containment of cable, typically of rectangular cross section with solid base and sides apart from ventilation slots.

1.5 Abbreviations

For the purpose of this Standard, the abbreviations given in AS/NZS ISO/IEC 14763.2 and those below apply:

ACMA	Australian Communications and Media Authority (formerly AUSTEL, ACA)
AS	Australian Standard
BIM	Building Information Modelling
CA	Communications Alliance (replaces former Australian Communications Industry Forum)
DOC	Depth of Cover (for buried pathways)
ER	Equipment Room
FRL	Fire Resistance Level
HDD	Horizontal Directional Drilling
IT	Information Technology
NCC	National Construction Code (of Australia) (incorporates BCA)
NZS	New Zealand Standard
TR	Telecommunications Room
TO	Telecommunications Outlet

Section 2 Structure of a pathways and spaces infrastructure

2.1 Multi-storey building (general, single tenant)

Refer to the high level requirements for planning a pathways and spaces infrastructure given in AS/NZS ISO/IEC 14763.2.

[Figure 2.1](#) illustrates the relationships between the major telecommunications pathway and space elements within a single tenancy multi-storey building.

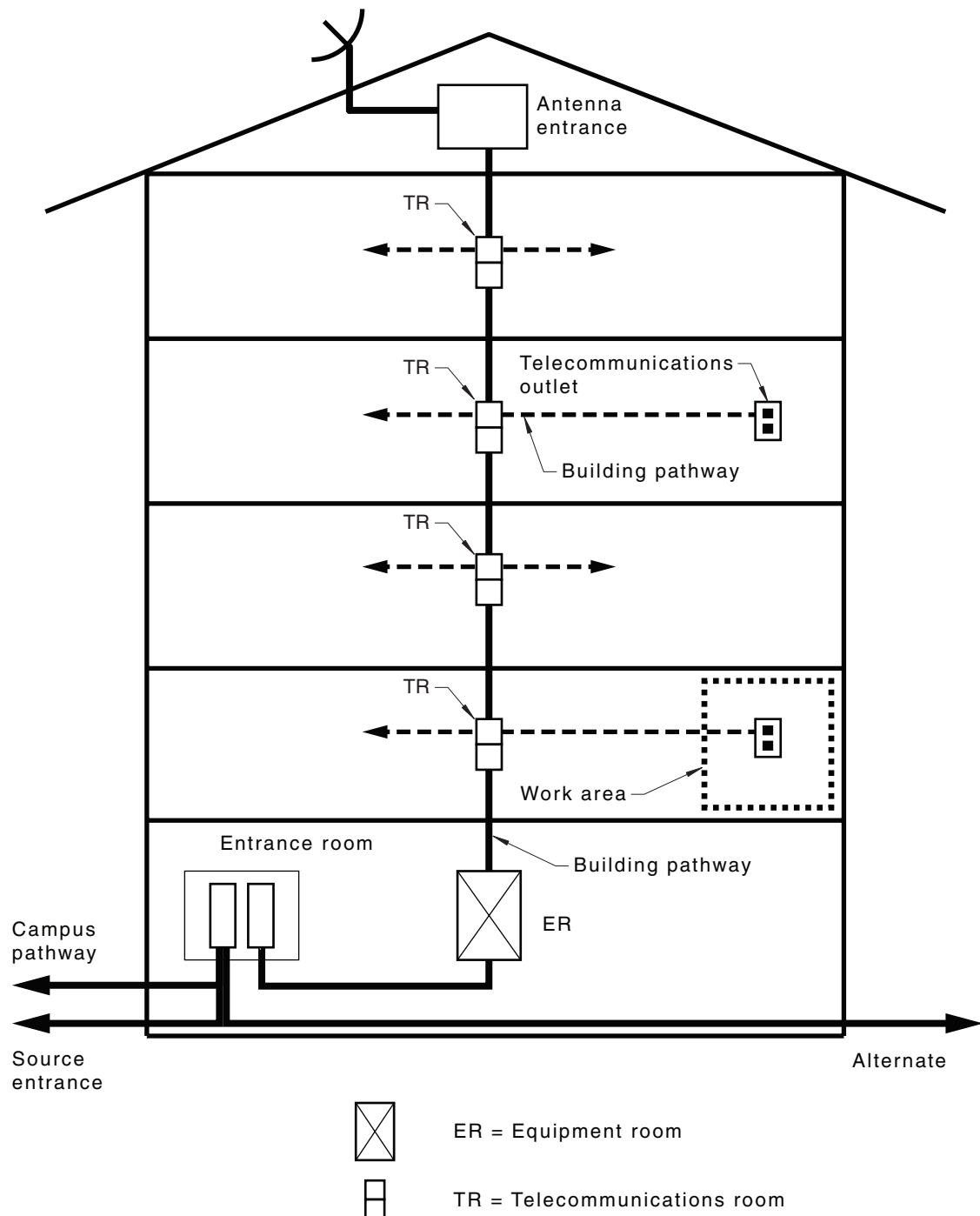


Figure 2.1 — Basic elements of a multi-storey building pathways and spaces infrastructure

2.2 Multi-tenant multi-storey building

Refer to AS/NZS ISO/IEC 14763.2 for requirements for common infrastructures within multi-tenant premises. The coverage includes an architecture diagram for a multi-storey building.

2.3 Single storey large floor footprint buildings

2.3.1 General

The same trunk and branch approach as for a multi-storey building shall be adopted for large footprint single storey buildings and campuses of single storey buildings.

2.3.2 Single tenant

Large footprint buildings (of floor area typically exceeding 1500 m²) should be segregated into communications cabling distribution zones of up to 1500 m², each containing a TR with a horizontal backbone pathway (complying with [Section 7](#)) to neighbouring TRs or to the ER.

[Figure 2.2](#) shows an example of a building of 6000 m² footprint in plan view. This example illustrates that layout of TRs in a large single storey building is less constrained than for a multi-storey building because the TRs do not need to be horizontally aligned or constrained to a rising services core. The backbone pathway may have the topology of a ring (as shown) or a tree (like a vertical backbone in [Figure 2.1](#) but oriented horizontally).

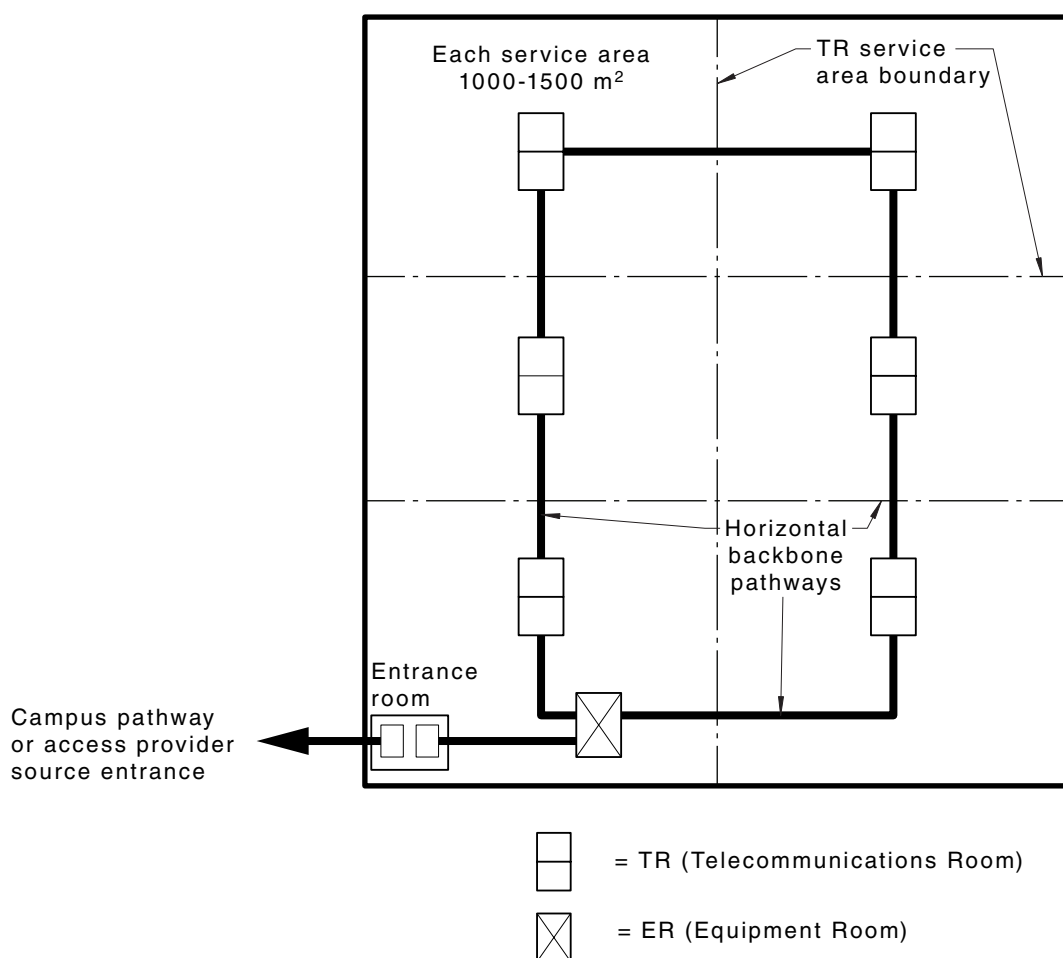


Figure 2.2 — Basic elements of a single storey building pathways and spaces infrastructure

The horizontal backbone pathway may be shared with horizontal outlet distribution following the same route providing sufficient cross sectional capacity is provided for both functions. Backbone cables shall be separately bundled and tied to outlet distribution cables.

2.3.3 Multi-tenant

Large multi-tenant footprint buildings (of floor area typically exceeding 1500 m²) should be segregated into communications cabling distribution zones of up to 4000 m², each containing a CTR with a horizontal backbone pathway (complying with [Section 7](#)) to neighbouring CTRs or to the CER.

A CTR may have pathways to the TRs of multiple tenants. From each CTR, a horizontal backbone shall extend to the first TR (or combined ER/TR) for each tenant served. If a tenancy is larger than 1500 m², it should be divided into distribution zones not exceeding 1500 m², each with its own TR or floor/zone distributor (with active equipment) cabinet. The tenant TRs or distributor cabinets shall be linked by horizontal backbone pathways to the first TR for that tenant.

[Figure 2.3](#) shows an example of a multi-tenanted building of 6000 m² footprint in plan view. CTRs should be located within (or on the perimeter of) common access areas within the building (such as a concourse or services corridor).

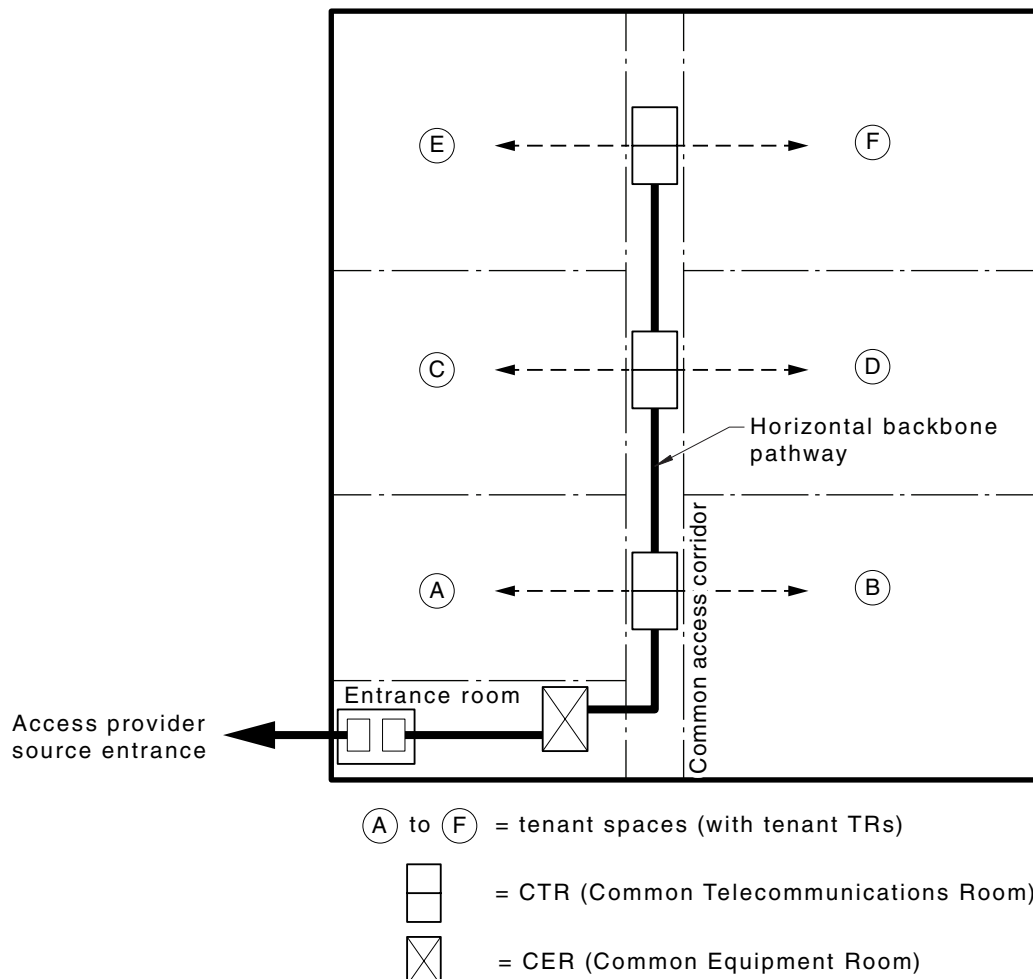


Figure 2.3 — Basic elements of a single storey multi-tenant infrastructure

2.3.4 Campus of single storey buildings

A campus of single storey buildings for a single tenant requires a minimum of one ER for the whole campus, which should be located in the same building as the access provider entrance facility and

access provider space. The ER has a horizontal backbone pathway to the campus backbone BEF in the same building. Each other building has a TR linked by horizontal backbone pathway to that building's BEF (or a combined TR/BEF) which terminates a branch of the campus (or inter-building) backbone pathway (see [Section 9](#)).

NOTE Large campuses or those housing critical facilities may have two or more equipment rooms for risk mitigation and redundancy.

[Figure 2.4](#) illustrates the basic elements of a campus infrastructure in plan view.

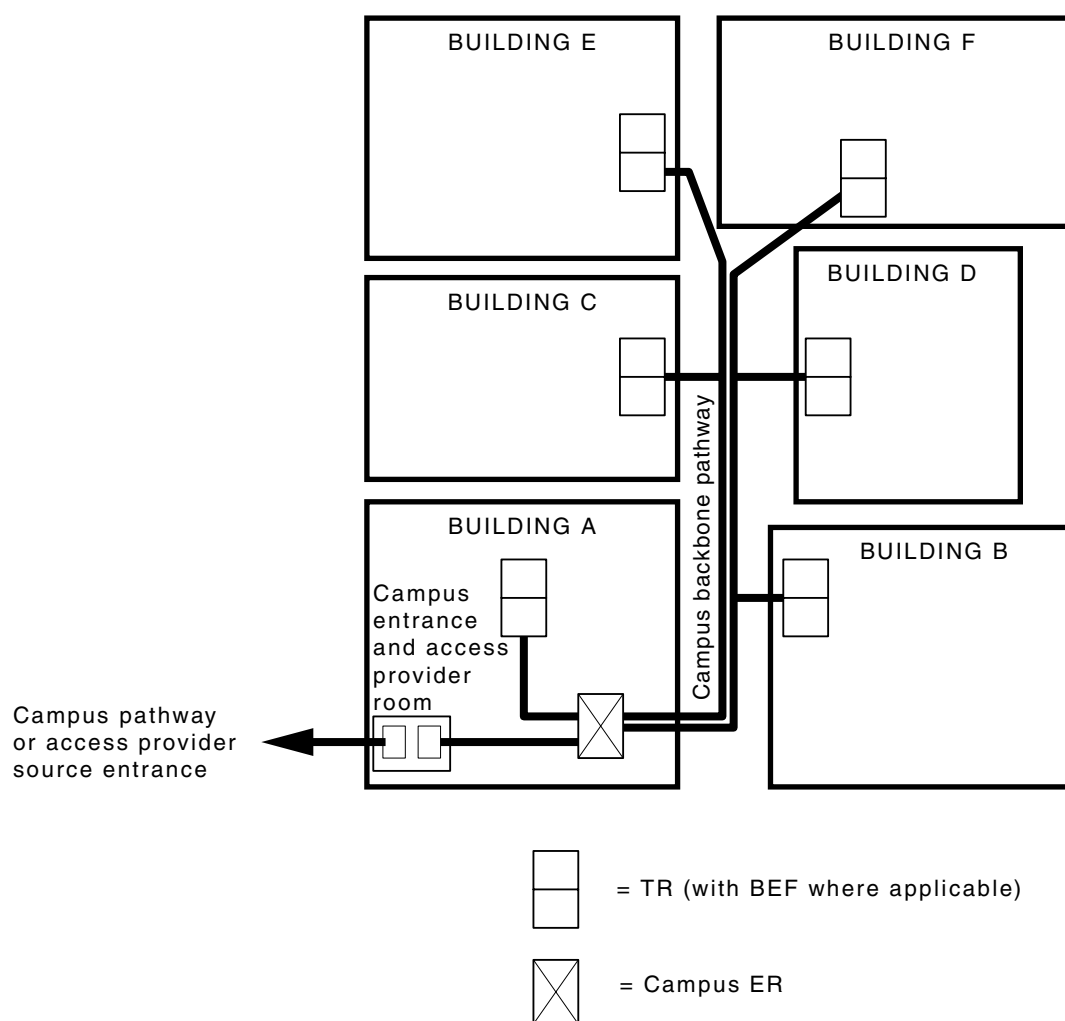


Figure 2.4 — Basic elements of infrastructure for a campus of single storey buildings

2.4 Campus with mixed single and multi-storey buildings

Where a campus contains a mixture of single and multi-storey buildings, the campus architecture should be as shown in [Clause 2.3.4](#), but with multi-storey buildings using the architecture of [Clauses 2.1](#) or [2.2](#) as applicable, noting that the ground floor may be serviced with only a BEF along with a TR housing the building distributor if a single ER serves the whole campus (as described in [Clause 2.3.4](#)).

Section 3 Telecommunications rooms

3.1 General

3.1.1 Introduction

This Section supplements the requirements and recommendations made for Telecommunications Rooms (TRs) and Common Telecommunications Rooms (CTRs) in AS/NZS ISO/IEC 14763.2.

3.1.2 Location

The telecommunications room should be located as close as practicable to the centre of the area served and preferably in the core area. Horizontal pathways should terminate in the telecommunications room located on the same floor as the area being served.

In a single tenant building, the Telecommunications Room should preferably be located in an accessible area on each floor, for example a common hallway. In a multi-tenant building, the Telecommunications Room for the tenant's communications services shall be within the tenancy.

3.1.3 Purpose

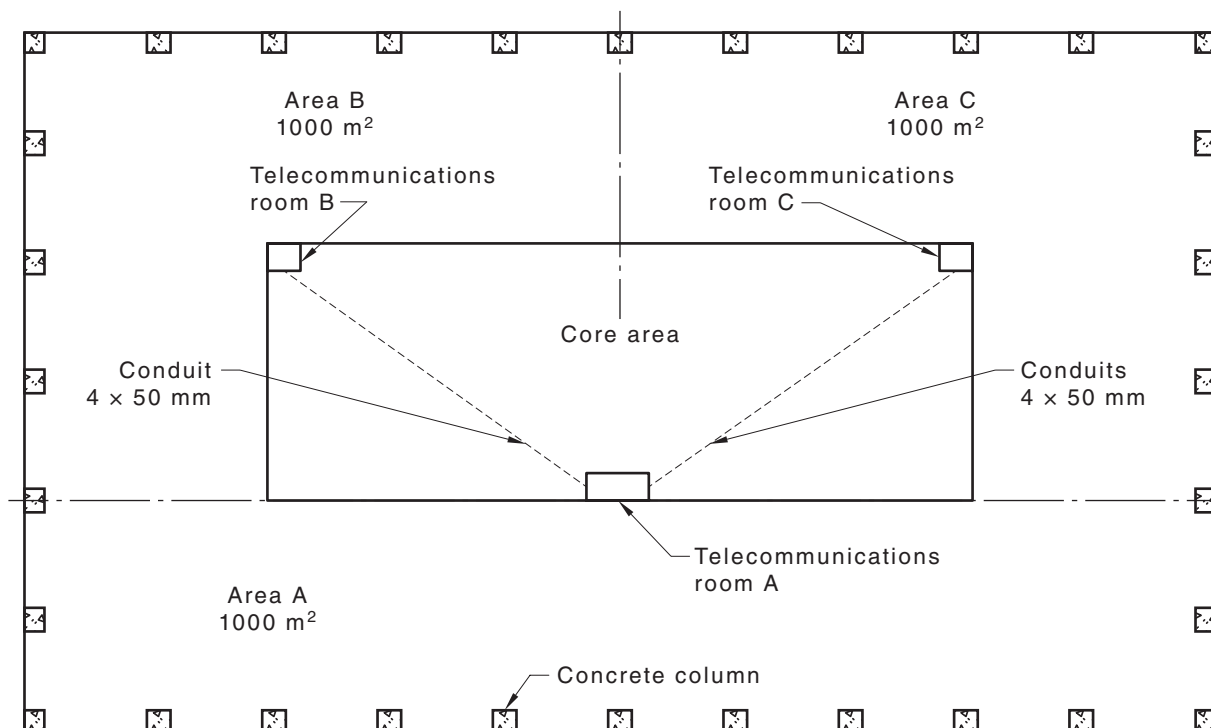
The telecommunications room space shall be dedicated to the telecommunications function and related support facilities. The telecommunications room space should not be shared with electrical installations other than those supporting telecommunications.

Equipment not related to the support of the telecommunications room (for example, piping, ductwork, etc.) shall not be installed in, pass through, or enter the telecommunications room. A telecommunications room shall not be used for storage of non-telecommunications materials, cleaning products and equipment or hazardous chemicals.

3.2 Size and spacing

3.2.1 Density

There shall be a minimum of one telecommunications room per floor. Additional rooms (one for each area up to 1500 m²) should be provided when the floor area to be served exceeds 1500 m² or when the horizontal cable pathway distance to any work area exceeds 90 m. See [Figure 3.1](#).



NOTE 1 The provision of direct conduits between TRs as shown is just one of a number of options and illustrates a direct draw-in pathway between rooms. The conduit size and count is illustrative only, and depends on the size and quantity of backbone cables and any segregation requirements.

NOTE 2 The presence of lifts and rising services within the core area will usually require a TR linking pathway to follow building rectangular lines rather than the direct route shown.

NOTE 3 The allocation of backbone pathway space on horizontal telecommunications cable trays located within accessible floor or ceiling spaces will be a more practical approach in most cases.

NOTE 4 This example shows three telecommunications rooms each with a coverage of 1000 m² because the shape of the spaces around the core precludes coverage by two TR's whilst maintaining a maximum of 90 m cable run length (when vertical drops at the ends and termination slack are considered).

Figure 3.1 — Typical floor layout for a large floor plate

3.2.2 Room linkage

Multiple rooms on a floor (including a tenant TR connected to a CTR) shall be interconnected by a horizontal backbone pathway capable of accommodating growth in cable density.

See [Clause 8.2](#) for requirements for linking TRs on different floors.

Connections between tenant TRs in a multi-tenant building on different but contiguous floors serving the same tenant may be effected—

- (a) indirectly via existing vertical pathways (such as riser penetrations in a CTR);
- (b) directly via core hole penetrations drilled in existing buildings (subject to structural engineering assessment and suitably banded and firestopped); or
- (c) via specially provided vertical backbone riser pathways in new buildings.

3.2.3 Size

Where active telecommunications equipment is to be included in the telecommunications room, it is desirable to provide room dimensions per [Table 3.1](#) based on a potential fitout density of one work area per 10 m².

Table 3.1 — Room dimensions

Serving area m ²	Recommended room dimensions mm	Minimum internal area m ²
1000–1500	3000 × 3400	10
800–999	3000 × 2800	8
500–799	3000 × 2200	6

3.2.4 Limited rooms

Where active telecommunications equipment is not to be included in the telecommunications room and free standing equipment cabinets with rear access are not required, the room dimensions shown in [Table 3.1](#) may be reduced accordingly.

3.2.5 Ceiling height

The height between the finished floor and the lowest point of the ceiling shall be a minimum of 2.2 m. For additional considerations, refer to AS/NZS ISO/IEC 14763.2.

3.2.6 Mounting of equipment

Adequate provision by way of floor or wall space allocation and clearances, structural load rating and fixing points shall be made for mounting of rack mount and wall mount equipment.

3.2.7 Layout

[Figure 3.2](#) shows a typical telecommunications room layout. This example is based on the TR having FRL rated walls (see [Clause 3.4.7](#)) and illustrates the provision of associated penetrations for horizontal distribution.

If the walls are not FRL rated, slot or sleeve openings without fire stopping may be provided.

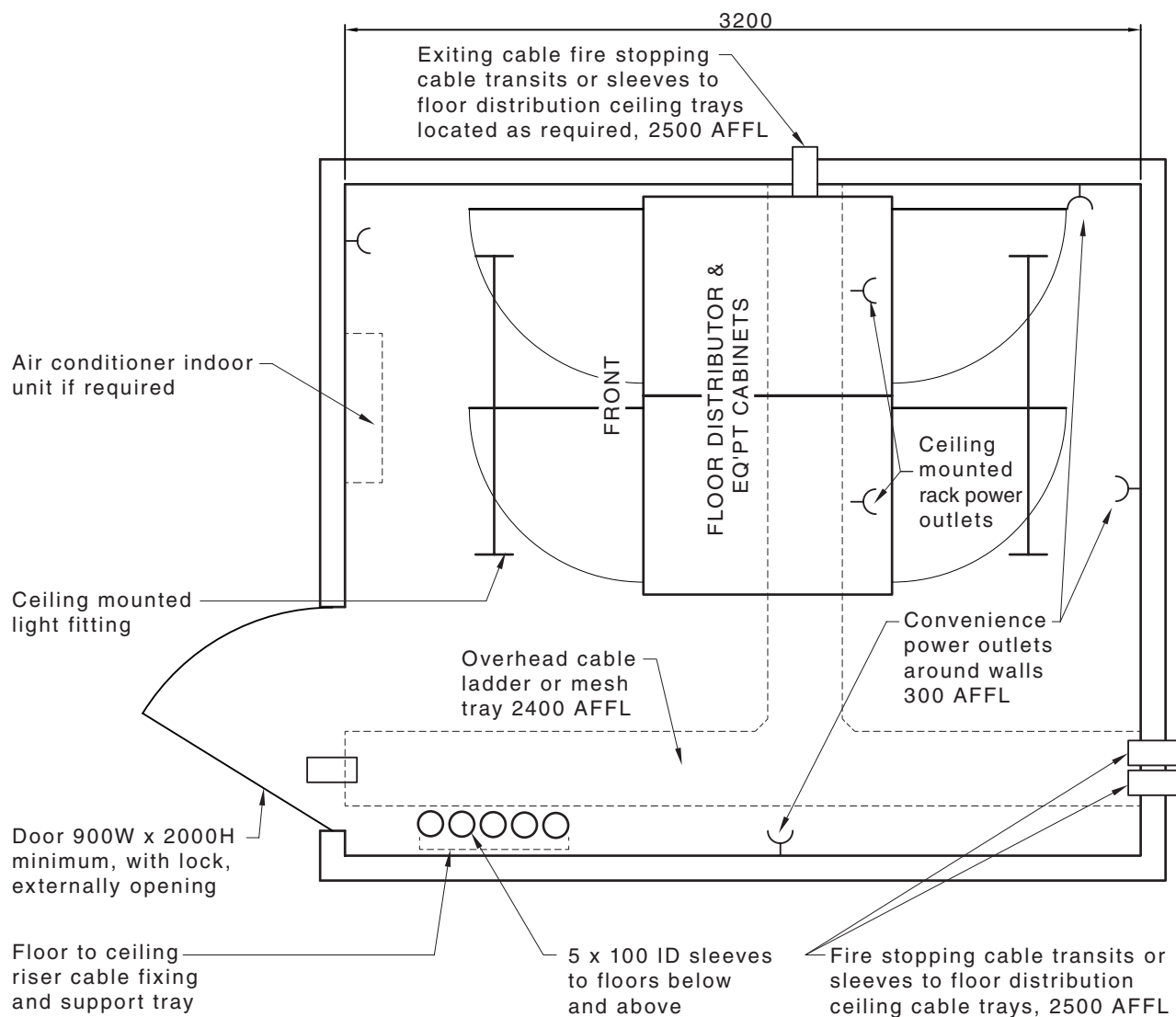


Figure 3.2 — Typical telecommunications room

3.3 Floor loading

Refer to AS/NZS ISO/IEC 14763.2.

3.4 Provisioning

3.4.1 Lighting

Refer to AS/NZS ISO/IEC 14763.2. The qualifications given in [Clause 4.4.10](#) in relation to lighting levels and in Note 5 regarding NCC compliance shall also apply to a TR.

3.4.2 Door

Refer to AS/NZS ISO/IEC 14763.2.

3.4.3 Ceiling

A suspended (or 'false') ceiling shall not be provided within TRs which contain the vertical rising cable pathway in a multi-storey building (as shown in [Figure 3.2](#)).

TRs in single storey buildings should be provided with a ceiling to separate them from the roof and roof cavity services, and to prevent dust and particle ingress from air circulating through roof space.

3.4.4 Treatment

Refer to AS/NZS ISO/IEC 14763.2 in relation to dust sealing.

Finishes should be light in colour to enhance room lighting. Consideration should be given to floor covering composed of antistatic material.

In cases where fireproofing may be sprayed onto the exposed ceiling, the fireproofing should be treated to mitigate airborne dust.

3.4.5 Electrical power

3.4.5.1 Power outlets

A minimum of two dedicated 230 V a.c. electrical outlets rated at 10 A or higher, each on separately protected circuits, shall be provided for equipment power. In addition, 'convenience' double general purpose outlets shall be placed near the centre and then at 1.8 m intervals on each perimeter wall, at a height of 300 mm above the floor (these do not need to be on separately protected circuits). If standby power is available, consideration should be given to automatic switch-over of power. The specific provision of outlets for equipment and convenience, along with their locations and rating, shall be coordinated with the telecommunications system designers and providers.

NOTE 1 Captive type outlets are recommended for equipment power to reduce the risk of accidental disconnection.

NOTE 2 In larger TRs with multiple equipment racks, it is desirable that a dedicated power distribution board be installed in the TR to serve the room equipment.

NOTE 3 Limited rooms (as described in [Clause 3.2.4](#)) without active equipment do not require equipment power outlets. A single two-gang convenience outlet should be provided in limited rooms.

3.4.5.2 Standby power

If a standby power source is available in the building, the TR power distribution board should be connected to the standby supply via 'essential' power submains.

3.4.5.3 Building earth

Access shall be made available to the building electrical earthing system for telecommunications earthing and bonding purposes as described in AS/CA S009.

3.4.6 Room penetrations

3.4.6.1 Sleeves/slots

Sleeves or slots through the room floor (and to the floor above) should be adjacent to (and not obstructed by) the door or in a location that lends itself to and offers sufficient clearance for cable pulling activity, without a significant risk of equipment cabinet and wall mounted items being damaged in the course of such cable pulling activity. Sleeves or slots shall not be left open except during cable installation and shall be firestopped to comply with the NCC. During overnight interruptions to cable pulling in an otherwise occupied and finished building, temporary fire stopping (such as by means of fire pillows) shall be fitted.

The number and size of sleeves, slots or conduit (sleeves) shall be determined in accordance with [Clause 8.5](#) (see [Figure 8.2](#)). Sleeves shall extend a minimum of 25 mm above the floor, but 50 mm to 100 mm is recommended if the sleeves are not banded as a group.

All slots and (unsleeved) floor penetrations should be banded using an upstand of at least 25 mm height.

NOTE This mitigates flooding of lower floors if one floor floods for any reason (e.g. sprinkler system operation). Fire pillows, which are normally used for firestopping, will not prevent water infiltration.

3.4.6.2 Other penetrations

Where the TR walls have a fire resistance level rating, the holes or slots in walls associated with any horizontal pathway routes from locations within the room to areas outside the room are also penetrations requiring firestopping (and potentially associated sleeves). See [Section 7](#).

3.4.7 Fire protection

Fire protection for the telecommunications room shall be provided in accordance with the NCC, where required by either—

- (a) the NCC; or
- (b) the building owner or tenant for operational reasons.

Sprinkler heads, if required as part of the fire protection treatment, shall be provided with wire cages to guard against accidental operation as a result of inadvertent impact damage. Consideration should be given to use of 'slow-blow' sprinkler heads or a 'dry pipe' sprinkler system in the TR where practicable and allowable.

3.4.8 Environmental considerations

3.4.8.1 General

TR temperature and humidity shall provide for continuous operation of the installed active equipment. Actual air handling requirements shall be calculated based on potential heating and cooling demand associated with equipment which may be present in the TR.

Other environmental considerations include:

- (a) *Continuous operation* If deployed, HVAC shall be available on a 24 hours-per-day, 365 days-per-year basis. A stand-alone unit should be considered for the TR.
- (b) *Standby operation* If a standby power source is available in the building, consideration should be given to also connecting the HVAC system serving the TR to the standby supply.
- (c) *Operation* Where HVAC is provided to the TR, the temperature and humidity shall provide for continuous operation of the installed active equipment.
- (d) *Positive pressure* Refer to AS/NZS ISO/IEC 14763.2.
- (e) *Batteries* If batteries are used for backup, adequate ventilation shall be provided to AS 3011.

3.4.8.2 Vibration

Mechanical vibration coupled to equipment or the cabling infrastructure can lead to service failures over time. A common example of this type of failure would be loosened connections. Potential vibration within the building will exist and will be conveyed to the TR via the building structure. In these cases, a relevant specialist should be consulted to design safeguards against excessive TR vibration.

3.4.8.3 Other mechanical fixtures

Mechanical fixtures (e.g. piping, ductwork, pneumatic tubing) not related to the support of the TR should not be installed in, pass through or enter the TR.

3.4.9 Seismic considerations

Installation practices in buildings classed as Importance Level 4 under the NCC shall ensure continuity of telecommunications services under seismic stresses to AS 1170.4. This will impact both the services and distribution infrastructure within the room as well as the seismic rating and mounting of equipment cabinets.

3.4.10 Water infiltration

A TR shall be free of water or drain pipes not directly required in support of the equipment within the room. A floor drain or sump shall be provided within the room if risk of water ingress exists. See [Clause 5.5](#) and [Clause 9.2.1](#) if the TR is combined with a building entrance facility.

3.5 Common telecommunications room

3.5.1 Purpose

A common telecommunications room (CTR) should contain only those facilities that serve multiple tenants in a building. Tenant customer premises equipment shall not be located in a CTR.

3.5.2 Location

Whenever practicable, CTRs in multi-level buildings should be vertically aligned. The CTR should be located central to the area served and accessible through common-use corridors.

3.5.3 General requirements and pathways

Refer to AS/NZS ISO/IEC 14763.2 requirements for common infrastructures within multi-tenant premises.

3.5.4 Architectural considerations

3.5.4.1 Size and quantity

Refer to AS/NZS ISO/IEC 14763.2.

NOTE Due to the requirement for separate TRs for tenants' floor distribution cabling and telecommunications equipment, the required room size for a CTR is smaller than for a TR (see [Clause 3.2.3](#)) and a CTR may serve a larger floor area than a TR. The CTR includes the primary riser pathway.

3.5.4.2 Mounting of equipment

As for single tenant Telecommunication Rooms. See [Clause 3.2.6](#).

3.5.4.3 Ceiling

The height between the finished floor and the lowest point of the ceiling shall be a minimum of 2.2 m. For additional considerations, refer to AS/NZS ISO/IEC 14763.2.

Suspended ceilings: As for single tenant Telecommunication Rooms. See [Clause 3.4.3](#).

3.5.4.4 Treatment

As for single tenant Telecommunication Rooms. See [Clause 3.3](#).

3.5.4.5 Lighting

As for Equipment Rooms (see [Clause 4.4.10](#)), and to AS/NZS ISO/IEC 14763.2.

3.5.4.6 Door

As for single tenant Telecommunication Rooms, to AS/NZS ISO/IEC 14763.2.

3.5.4.7 Floor loading

As for single tenant Telecommunication Rooms, to AS/NZS ISO/IEC 14763.2.

3.5.4.8 Room penetrations

As for single tenant Telecommunication Rooms. See [Clause 3.4.6](#).

3.5.4.9 Fire protection

As for single tenant Telecommunication Rooms. See [Clause 3.4.7](#).

3.5.4.10 Signage

Refer to AS/NZS ISO/IEC 14763.2.

3.5.4.11 Seismic considerations

As for single tenant Telecommunication Rooms. See [Clause 3.4.8.3](#).

3.5.5 Environmental considerations

As for single tenant Telecommunication Rooms. See [Clause 3.4.8](#).

3.5.6 Electrical considerations

3.5.6.1 Power

A CTR shall be equipped with a minimum of—

- (a) four electrical convenience dual gang power outlets on a single circuit; and
- (b) four electrical dual gang power outlets all on dedicated circuits for equipment power, each 10 A minimum rated.

Convenience power outlets shall be placed towards the centre of the perimeter walls or at 1.8 m intervals at a height of 300 mm AFFL.

NOTE It may be desirable to install dedicated feed-through power panels to serve groupings of vertically aligned CTRs.

3.5.6.2 Standby power

As for single tenant Telecommunication Rooms. See [Clause 3.4.5.2](#).

3.5.6.3 Building earth

As for single tenant Telecommunication Rooms. See [Clause 3.4.5.3](#).

3.5.7 Water infiltration

As for single tenant Telecommunication Rooms. See [Clause 3.4.10](#).

Section 4 Equipment rooms

4.1 General

4.1.1 Introduction

This Section supplements the requirements and recommendations made for Equipment Rooms (ERs) and Common Equipment Rooms (CERs) in AS/NZS ISO/IEC 14763.2.

4.1.2 Purpose

An ER comprises a centralised space for telecommunications equipment such as customer switching system, computing equipment, audio-visual equipment, and CCTV and security head end equipment, which serves either—

- (a) the facility manager and all occupants and tenants of a building (or a campus); or
- (b) the occupants of a single tenancy (in the case of a multi-tenant building).

Any or all of the functions of a TR or BEF may also be provided within an ER.

Additional requirements apply for CERs in multi-tenant buildings (see [Clause 4.2.3](#) and [Clause 4.4.10](#)).

The ER shall house only equipment directly related to the respective tenant or building telecommunications and related information systems and their environmental and security support systems.

An ER shall not be used for storage of cleaning products and equipment, hazardous chemicals, or products which could provide a fire fuel source such as empty cardboard, plastic and paper packaging.

NOTE The room will typically house a single bayline of equipment cabinets for buildings or tenancies of several thousand m² areas, and range through to the form of a small data centre for areas over 10 000 m².

4.1.3 Buildings forming part of a campus

A building which forms part of a campus need not have its own ER if it is served by an ER in another building on the campus.

A 'campus' ER shall be dimensioned consistently with the functions and aggregate floor area of all the buildings it serves.

4.2 Location

4.2.1 Expansion provisions

ER locations that are restricted by building components limiting expansion, such as elevators or fixed building walls shall be avoided.

4.2.2 Access

Accessibility for the delivery of large equipment to the ER should be provided.

4.2.3 Multi-tenant buildings

To comply with AS/NZS ISO/IEC 14763.2, equipment that will be used by an individual tenant solely for that tenant's internal communications between floors or to accommodate the tenant's own information

or security system servers and storage should be separately housed in a tenant ER (or data centre) located within the respective tenancy.

NOTE Carriers may refuse to run their cables or services to a tenant's ER unless the cables or services are solely for use by that tenant.

A CER in a multi-tenant building may be combined with the functions of an access provider equipment space to [Clause 5.3.6.2](#) providing that the requirements of security and access of all room occupants are met (such as by means of secure cages and common walkways).

4.2.4 Pathway proximity

It is desirable to locate the ER close to the backbone pathway.

4.2.5 Floor

Refer to AS/NZS ISO/IEC 14763.2 for floor loading and access floor tile opening requirements.

Floor loading capacity in the ER shall be sufficient to bear both the distributed and concentrated load of the installed equipment. The concentrated loading capacity shall be greater than 8.8 kN over the area of greatest stress, which is to be specified by the room layout planner.

4.2.6 Water infiltration

The ER shall not be located below flood water level unless preventive measures against water infiltration are employed. The room shall be free of water or drain pipes not directly required in support of the equipment within the room. A floor drain or sump shall be provided within the room if a risk of water ingress exists. See [Clause 5.5](#) if the ER contains a building entrance facility.

4.2.7 Electromagnetic interference

The room shall be located away from sources of electromagnetic interference. Special attention shall be given to electrical power supply transformers, motors and generators, X-ray equipment, radio or radar transmitters and induction sealing devices.

4.2.8 Environmental considerations

The ER shall undergo the same environmental design considerations concerning vibration as a TR (see [Clause 3.4.8.2](#)).

4.2.9 Fire resistance

The ER should be designed and constructed such that the room comprises a one hour (or higher) fire resistant compartment ($\geq$ FRL60/60/60 to AS 1530.4).

4.3 Size

4.3.1 General

The ER shall be sized to meet the known requirements of specific equipment. Sizing shall include projected future as well as present requirements.

Where a room or space is intended to be used for more than equipment (for example, the main terminal and/or entrance facility), it shall be increased in size accordingly and meet the requirements specified in the respective clauses for these facilities.

4.3.2 Guidelines for general voice and data

When designing the ER floor space, allowance should be made for non-uniform occupancy throughout the building. It is desirable to provide 0.07 m² of ER space for every 10 m² work area space, plus 0.02 m² of ER space for every 23 m² of floor area for Building Automation System (BAS) devices. The equipment room shall be designed to a minimum of area of 12 m².

4.3.3 Specific guidelines for special-use buildings

In special-use buildings (e.g. hotel, hospital, laboratory), ER floor space allocations shall be based on the known number of work areas (not on useable floor area) as shown in [Table 4.1](#).

Table 4.1 — Equipment room floor space in special use buildings

Work areas	Area m ²
Up to 100	14
101 to 400	37
401 to 800	74
801 to 1200	111

4.3.4 Guidelines for other equipment

The installation of environmental control equipment, such as power distribution or air conditioning systems, and uninterruptible power supplies (UPS) up to 100 kVA capacity is permitted in the ER. UPS larger than 100 kVA should be located in a separate (and climate controlled) room for ventilation, electrical and fire safety reasons.

4.4 Provisioning

4.4.1 Layout

Layout should be planned in consultation with equipment providers, taking into consideration weight and distance limitations between cabinets. Doors providing access to other areas of the building through the ER should be avoided in order to limit access to the ER to authorized personnel only. For a minimum size equipment room (12 m²) the door shall open outwards to facilitate egress in an emergency.

4.4.2 Clearance height

Minimum clear height (i.e. without obstructions) in the room shall be in accordance with AS/NZS ISO/IEC 14763.2.

4.4.3 Suspended ceiling

A suspended ceiling should not be provided within the ER. In such cases where fireproofing may be sprayed onto the exposed ceiling, the fireproofing should be treated to mitigate airborne dust.

4.4.4 Contaminants

The ER should be protected from contaminants and pollutants that could affect operation and material integrity of the installed equipment.

4.4.5 Pathways

4.4.5.1 Backbone connections

The ER shall be connected to the backbone pathway. Horizontal pathways linking the ER to a TR, vertical backbone pathways or a campus backbone BEF shall comply with [Section 7](#).

The following considerations apply to connections from the ER to the backbone pathway:

- (a) Where the ER has FRL rated walls or ceiling recommended in [Clause 4.2.9](#), the holes through the walls or ceiling to allow the passage of cables from the inside to the outside of the room are penetrations and shall be firestopped.
- (b) Where the ER walls are not FRL rated, horizontal pathways into the room should still be sealed to prevent dust and unconditioned air ingress.
- (c) Any conduit runs entering a non-FRL rated ER from uncontrolled or independently controlled environments outside the room shall be broken outside the room, and the conduit section entering the room shall be air-tight sealed outside the room.

NOTE This is to prevent warm air with a higher dew point passing through the conduit and condensing in the cooler ER environment, thereby causing water ingress, notably in tropical locations.

4.4.5.2 Pathways inside the ER

Pathways within the equipment room shall generally comply with the requirements of—

- (a) AS/NZS ISO/IEC 14763.2, in particular the annex applying to pathways for cabling in data centres; and
- (b) [Section 7](#) Horizontal Pathways, in particular [Clauses 7.1](#) to [7.3](#).

4.4.6 Optical fibre trunking (raceway) for patch cords

4.4.6.1 Application

Within an ER, where optical fibre patch connections are required between equipment items in different cabinets, and between cabinets and a building optical distribution frame or cabinet, the provision of an overhead optical fibre trunking or 'raceway' system is recommended to protect and support the optical fibre cords.

NOTE 1 In this Standard the term 'trunking' is used in view of such systems having removable covers, although the term 'optical fibre ducting' is in common use in Australasia.

NOTE 2 Multi-fibre fixed building cable terminated in fibre optic break out trays should be run on fixed telecommunications cable trays, ducts and the like and not through optical fibre trunking provided for patch connections. Reasons include size, weight, bending radius restrictions, difficulty of accessing patches below and risk of existing patch cord damage during installation.

4.4.6.2 Construction properties

Optical fibre trunking shall be of all dielectric halogen free and flame retardant construction with clip on covers and clearly identified by colour and labelling as being for the purpose of running optical fibre cord connections.

4.4.6.3 Planning

The following shall be considered when planning optical fibre trunking:

- (a) The trunking size and fittings shall be selected to achieve a worst case fill factor of <40% anywhere in the ducting after all future service or connection growth potential is accounted for. The capacity will typically be up to thousands of 2 mm fibre cords on the main duct and hundreds of cords through any exit.
- (b) Fill factor calculations shall take into account the reduction in available cross section at every 'waterfall', 'downspout' or 'exit' insertion point at rack locations.
- (c) The trunking shall be routed above all equipment room bay lines and along the wall of any wall mount or floor standing front access optical cross connect frames.
- (d) The layout shall be designed to complement cable tray or trough for other fixed cabling and not interfere with the expansion of the fixed cabling. In this respect, the optical fibre trunking is typically located under, or adjacent to, cable trays for power and communications.

Incorporation of the optical fibre trunking in a Building Information Model (BIM) three dimensional layout for the equipment room is recommended to allow discovery and avoidance of pathway clashes.

4.4.6.4 Diversity

Where redundancy or availability criteria require that the patches between two end points need to be duplicated over diverse paths, the trunking shall facilitate the route diversity by either—

- (a) two separate trunking runs over the same route (typically tiered vertically with appropriate spacing), possibly in two different colours for ease of identification; or
- (b) creating one or more trunking loops around the bay lines and/or the entire room and defining loop sectors as 'a' or 'b' paths.

4.4.6.5 Trunking installation

The following considerations apply to installation of optical fibre trunking:

- (a) The trunking should be suspended from the ceiling or supported from the walls and may share supports with overhead cable tray where running side by side with the cable tray, or be fixed via adaptors underneath the cable tray.
- (b) Mounting supports should be located as close to joins or drop-offs as possible.
- (c) Where necessary to meet the earthquake survival requirements of a building (typically classified as Importance Level 3 or Importance Level 4) under the NCC to AS 1170.4 or equivalent New Zealand requirements, trunking shall—
 - (i) comply with Telecordia Technology standard GR-63 NEBS earthquake shake and vibration test criteria; and
 - (ii) be provided with flexible joints and redundant suspension ties.
- (d) The trunking bends and guides shall comply with the minimum bending radius criteria for such cords (or non-fixed cables) given in AS/NZS ISO/IEC 14763.2.
- (e) Radius bend drops should be provided at every rack or cabinet position where an optical fibre connection is required:
 - (i) Drops may be inserted by cutting into the side of trunking or provide a radius bend over the top of the side.

- (ii) At cabinet positions where there is no initial requirement for optical fibre connectivity, a provision (such as a blanking section) should be made to install a drop in the future.
- (f) Where trunking sections require cutting to insert a connection or extension, a fine pitch saw blade (<1.5 mm tooth pitch) shall be employed. Burrs arising from cutting trunking elements shall be removed before assembly.

4.4.6.6 Installation of cords within optical fibre trunking

The following shall be considered when installing fibre patch cords into the trunking:

- (a) Cords shall be routed directly through the trunking without slack loops.

NOTE Cable slack should be managed by radius slack spools provided in the distributor and equipment cabinets, or avoided by ordering cords to the required length.
- (b) Joints between short cords shall not be placed within the trunking if avoidable.
- (c) Fixed campus, building, or inter-cabinet multi-strand loose tube or tight buffered backbone cable shall not be laid in, or run through, optical fibre trunking for patch cords.

NOTE Colour coding of cords laid in the trunking and associated with different critical systems should be considered (refer to recommendations in AS/NZS ISO/IEC 14763.2).

4.4.7 Sprinklers

The requirements for fire protection of TRs in [Clause 3.4.7](#) also apply for ERs. Refer to AS 2118 (series).

Refer also to AS/CA S009 for requirements where the ER includes the function of a BEF and contains a distributor that terminates a carrier's lead-in cabling.

4.4.8 Heating ventilation and air-conditioning (HVAC) equipment

4.4.8.1 Capacity

ER temperature and humidity shall provide for continuous operation of the installed active equipment. Actual air handling requirements shall be calculated based on potential heating and cooling demand associated with equipment which may be present in the ER, including, but not limited to the following:

- (a) Servers and storage.
- (b) Backbone and core data switches, routers and network management.
- (c) PBXs and key systems including call management servers for IP telephony systems.
- (d) Coaxial amplifiers.
- (e) Distributed antenna system head ends.
- (f) CCTV, security and access control head end equipment.
- (g) Public address and life safety head end equipment.
- (h) Building automation and facility management equipment.
- (i) Audio visual and video distribution equipment.
- (j) Uninterruptible power supplies.