Cabling of premises for telecommunications

Telstra requirements for customer MDFs

IT'S HOW WE CONNECT

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Summary

This document sets out Telstra's requirements for the installation of any main distribution frame (MDF) in customer premises (referred to herein as a "customer MDF") that is to be used to connect Telstra's copper twisted pair lead-in cabling. It includes the requirements of Australian Standard AS/CA S009, *Installation requirements for customer cabling (Wiring rules)*.

This document is optimised for reading on a tablet or portable computer to take advantage of hyperlinks, document search functions and on-screen magnification of photographs and drawings.

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1 PURPOSE

This Document sets out Telstra's requirements for main distribution frames (MDFs) installed in customer premises ("customer MDFs") for termination of Telstra copper twisted pair lead-in cables. Some practical guidance is also provided on the installation and use of customer MDFs.

The Telstra documents may be downloaded from the "Builders" menu of the Telstra Smart Community® website (http://www.telstra.com.au/smart-community/builders/).

2 SCOPE

This Document applies to the initial installation and any subsequent augmentation ("upgrade") of a customer MDF at business or residential premises.

3 INTRODUCTION

3.1 What is an MDF?

A **customer MDF** is a **distributor** that terminates, or is intended to terminate, a carrier's **twisted pair** lead-in cabling at the customer's building. A distributor (known previously as a "distribution frame") is used to connect cables that run to different parts of the building from a common point and provides for cross-connection of cables by means of jumpers or patch cords. Not all distributors are MDFs but all MDFs are distributors.

There may be more than one MDF in a building (e.g. for termination of different carriers' networks or separate twisted pair lead-in cables derived from different technologies).

A customer MDF is supplied and installed by the builder's, owner's or customer's cabling provider as part of the building telecommunications cabling.

The MDF has a "carrier side" and a "customer side" (commonly referred to as "A" side and "B" side). The "A" side contains the carrier's lead-in cable terminations, and the "B" side contains the customer cabling terminations. Telstra supplies, installs and maintains the termination modules on the "A" side of the MDF for connection of Telstra network cables.

Cross-connections are made between the "A" side and the "B" side of the MDF using "jumpers". A jumper is a pair of twisted, insulated conductors that is connected to the termination modules using a tool designed for the purpose. Cross-connections in an MDF must **not** be made by means of patch cords or "pigtails" (i.e. using plug-connected cords and sockets) for reasons explained in 6.9 on page 21.

An MDF is a defined network boundary point under section 22 of the Telecommunications Act 1997 and, where used, delineates between a carrier's (e.g. Telstra's) network and "customer cabling". The MDF is the network boundary for all services supplied through it to customers located in the same premises in which the MDF is located. The precise location of the network boundary within the MDF is the jumper terminations on the customer side of the MDF, i.e. "the side of the frame nearest to the end-user".

The functional elements of a customer MDF are illustrated in Figure 1.

3.2 What is not an MDF?

MDFs are only defined in Australian Standard AS/CA S009, *Installation requirements for customer cabling (Wiring rules)*, for connection of **twisted pair** lead-in cables and **not** for **coaxial** or **optical fibre** lead-in cables. Any device used to connect coaxial or optical fibre lead-in cable is **not** an MDF. However, coaxial or optical connections may be included on the customer side of the MDF (e.g. for connection of coaxial or optical fibre customer cabling to other coaxial or optical fibre customer cabling).

Any device that interconnects cables **without jumpers** (or patch cords) is **not a distributor** and, therefore, **cannot be an MDF**.

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3.3 When is an MDF required?

Telstra considers that a customer MDF is required in one or more of the following circumstances:

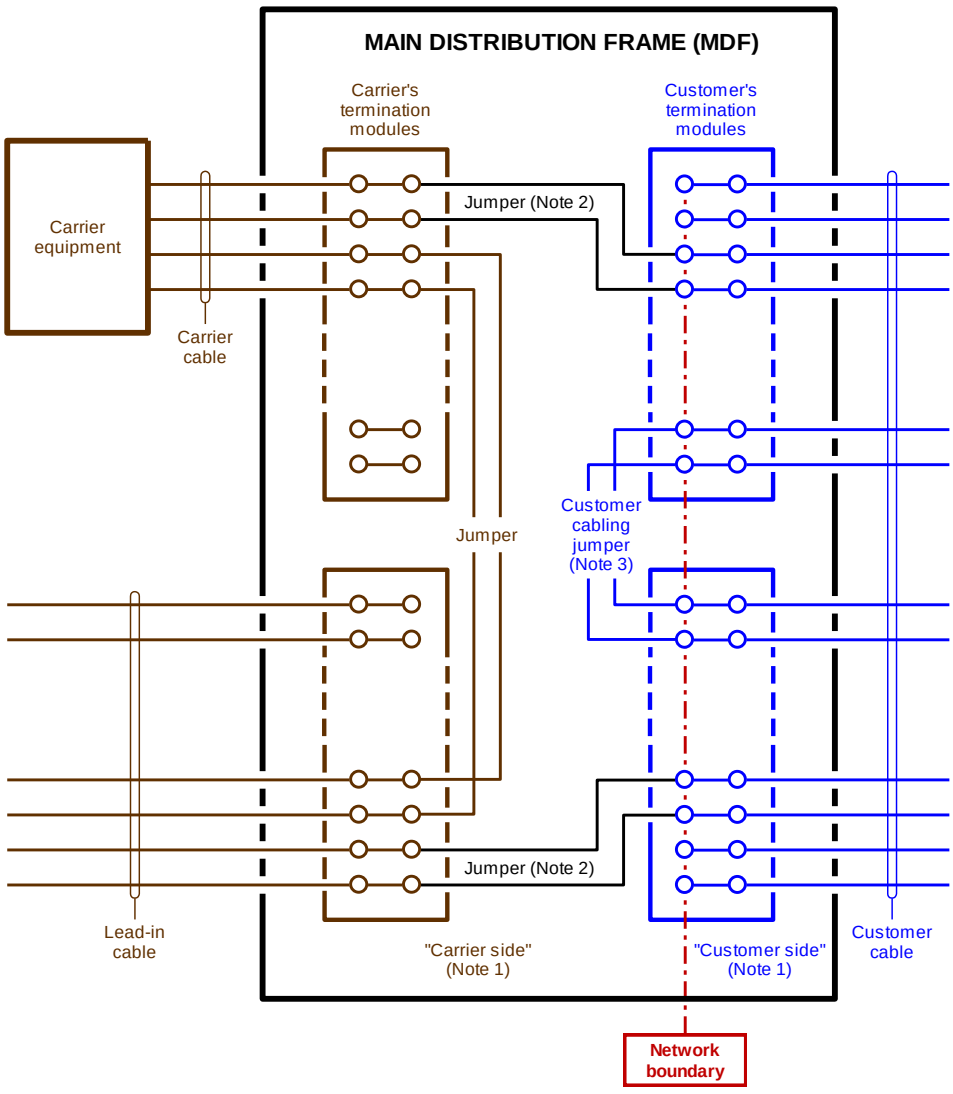
- two or more carriers will supply services to the premises and share the customer cabling
- two or more customers will occupy the premises
- the total capacity of the lead-in cabling will be ten (10) pairs or greater (except in the case of a 10-pair lead-in cable to a home or small business in a rural area — see Note 1)
- more than four (4) network lines are to be connected initially (Note 2)
- more than eight (8) telecommunications outlet cables are to be connected initially (Note 2).

Notes:

1. 10-pair cable is Telstra's standard size of lead-in cable for rural areas. While a 10-pair rural lead-in cable may terminate on a Telstra NTD, a 10-pair urban lead-in cable should be terminated on a customer MDF.
2. Telstra's Network Termination Device (NTD) will connect up to six (6) lines and twelve (12) internal cables for a **single customer**, which may avoid the need for the use of an MDF in some cases. However, use of this NTD for new installations is limited to four (4) lines and eight (8) internal cables to allow room for expansion. See Telstra Document No. 012688, *Telstra Network Termination Device (NTD) — Information for cabling providers*.

Telstra does not normally accept responsibility for cabling on the customer side of the MDF but may use such cabling to supply a telecommunications service to the point where the customer requires it.

Figure 1 Functional elements of a customer MDF [Figure J18 of AS/CA S009:2013]



3.4 Interpretation

The MDF must meet the compliance labelling requirements of the Australian Communications and Media Authority (ACMA) and must be installed in accordance with the requirements of Australian Standard AS/CA S009, *Installation requirements for customer cabling (Wiring rules)*. These requirements are summarised in this Document. The MDF must also meet Telstra's requirements as set out in this Document. Telstra will not connect its lead-in cabling to any customer MDF that does not meet all requirements.

Notes:

1. The wiring rules (AS/CA S009) may be downloaded free of charge from the Communications Alliance web site at http://www.commsalliance.com.au/Documents/CE-Standards.
2. Other relevant standards (available for purchase from SAI Global www.saiglobal.com) are:
   - AS/NZS 3084, *Telecommunications installations — Telecommunications pathways and spaces for commercial buildings*
   - AS/NZS 3085.1, *Telecommunications installations — Administration of communications cabling systems — Basic requirements*
   - AS/NZS 3080, *Telecommunications installations — Generic cabling for commercial premises*.

In this Document, the use of the words "**must**", "**must not**", "**shall**" and "**shall not**" signify:

- a legal obligation;
- an important safety, technical or operational requirement; or
- a mandatory condition of this Document.

Use of the words "**should**" or "**should not**" denote a recommendation of this Document or of a relevant standard.

Text boxed like this contains an alert or key information.

4 WIRING RULES REQUIREMENTS FOR CUSTOMER MDFs

General

The MDF must comply with the requirements set out in Australian Standards AS/CA S008, *Requirements for customer cabling products*, and AS/CA S009, *Installation requirements for customer cabling (Wiring rules)*. These requirements are summarised below.

Note: Because the MDF is a distributor, it must meet the requirements for all distributors (per section 12 of AS/CA S009) plus the additional MDF requirements (per section 13 of AS/CA S009).

The relevant parts of AS/CA S008:2010 and AS/CA S009:2013 are indicated in brackets [ ].

Note: These standards may be downloaded free of charge from the Communications Alliance web site at http://www.commsalliance.com.au/Documents/CE-Standards.

Location

(a) The proposed location of the MDF should be **discussed with the carrier** (e.g. Telstra) prior to installation. [AS/CA S009:2013 Clause 13.3, Note]

(b) The MDF should **not** be located in the same room as any **HV electrical equipment**. [AS/CA S009:2013 Clause 9.1.3.1 Note 2]

(c) The MDF should be located in the **same building as the end-user**. [AS/CA S009:2013 Clause 13.3 (a)]

(d) The MDF should be located near the main or first LV electrical switchboard **at the building** to enable bonding/earthing of surge suppression devices within the conductor length limits described in AS/CA S009 (1.5 m/10 m — see 6.15 on page 27 of this Document). [AS/CA S009:2013 Clause 13.3 (b)]

(e) The MDF shall be structurally robust and shall be securely **attached to a permanent building element** such as a wall, floor or column (mounting on hinged panels or wheeled trolleys is not permitted). [AS/CA S009:2013 Clauses 13.2 (b), 13.3 (d)]

(f) Any MDF installed inside the building shall be installed in a **position free from the ingress of dust and moisture and not subject to damp and/or humid conditions**. [AS/CA S009:2013 Clause 13.3 (c)]

(g) The MDF shall **not** be installed in any of the following locations:

- within any area classified as a hazardous zone [AS/CA S009:2013 Clauses 7.1.2, 7.1.3.7]
- in any room containing washing, bathing, shower or toilet amenities [AS/CA S009:2013 Clause 13.4 (a)]
- in a boiler, plant or machine room [AS/CA S009:2013 Clause 13.4 (b)]
- in any area subject to corrosive fumes or fluids [AS/CA S009:2013 Clause 13.4 (c)]
- in a fire escape stairway [AS/CA S009:2013 Clause 13.4 (d)]
- near an automatic sprinkler unless the MDF is provided with a shield to prevent water falling on it, or all sprinkler heads that could project water onto the MDF have suitable deflectors, or the sprinkler heads are of the dry type [AS/CA S009:2013 Clause 13.4 (e)]
- within a cupboard containing a fire hose reel [AS/CA S009:2013 Clause 13.4 (g)]
- near a bath, shower, basin, tub or other fixed water container [AS/CA S009:2013 Clauses 7.2.2.2 (a) to (c), 13.4 (f)]
- near a spa pool, spa tub or swimming pool [AS/CA S009:2013 Clauses 7.2.2.2 (d) and (e), 13.4 (f)]
- near a fountain or water feature [AS/CA S009:2013 Clauses 7.2.2.2 (f), 13.4 (f)]
- within a room or enclosure containing a sauna heater [AS/CA S009:2013 Clauses 7.2.2.2 (g), 13.4 (f)]
- within a refrigeration room [AS/CA S009:2013 Clauses 7.2.2.2 (h), 13.4 (f)]
- within the hosing down area of any location where general hosing down operations are carried out. [AS/CA S009:2013 Clauses 7.2.2.2 (i), 13.4 (f)]

Enclosure

(h) Cable **entry holes** shall be **free of sharp edges or burrs** or shall have a grommet of insulating material fitted. [AS/CA S009:2013 Clauses 12.5 (a), 13.2 (a)]

(i) The MDF enclosure shall be designed so as to **prevent access to live parts** by unqualified persons. [AS/CA S009:2013 Clauses 4.4 (a), 12.5 (c), 13.2 (a)]

(j) The MDF enclosure shall be **free of exposed sharp edges**. [AS/CA S009:2013 Clauses 12.5 (d), 13.2 (a)]

(k) The enclosure shall provide a minimum clearance of **30 mm** between the carrier's termination modules and the inside face of the front cover or door of the enclosure in the fully closed position. [AS/CA S008:2010 Clause 5.4.2.4, AS/CA S009:2013 Clause 13.10]

External (outdoor) MDF

(l) If the MDF is **exposed to the weather**, it shall have a **minimum degree of protection** against the entry of water of **IPX3** of AS 60529 or shall be enclosed in an enclosure assessed against the relevant clauses of AS/CA S008 and that provides a minimum degree of protection of IPX3. [AS/CA S009:2013 Clauses 12.4 (a), 13.2 (a)]

(m) If the MDF is **exposed to the weather**, the MDF and the cables connected to it shall be installed in such a way that a minimum degree of protection of **IPX3** of AS 60529 **is maintained**. [AS/CA S009:2013 Clauses 12.4 (b), 13.2 (a)]

Security

(n) The MDF, or the enclosure in which it is located, shall have **provision** for **securing with a key, lock or tool**. [AS/CA S009:2013 Clause 13.5]

(o) The **building owner, manager or occupant** is responsible for the **security** of the MDF. [AS/CA S009:2013 Clause 13.5 Note 2]

(p) The MDF should be **adequately secured against vandalism and access by children or unauthorised persons** but reasonable access should be given to carriers, carriage service providers and cabling providers, as required. [AS/CA S009:2013 Clause 13.5 Note 2]

Access

(q) **Adequate space** shall be provided around the MDF where persons are to pass to enable **safe and convenient access** to the MDF and **ready escape** from the vicinity under emergency conditions. An MDF is deemed to comply with this requirement if it is installed in accordance with Appendix D of AS/CA S009 (see **Figure 2 to Figure 5** of this Document). [AS/CA S009:2013 Clause 13.6]

(r) Any room containing the MDF **shall not require the use of a tool, key, card, number pad** or the like **to exit the room**. [AS/CA S009:2013 Clause 13.8]

(s) The **highest terminal or socket** of a **wall-mounted MDF** (whether internal or external) shall not be greater than **1800 mm** from finished ground or floor level. [AS/CA S009:2013 Clause 13.7.1]

(t) The **lowest terminal or socket** of any **external (wall-mounted) MDF** shall not be less than **350 mm** from finished ground or floor level. [AS/CA S009:2013 Clause 13.7.2.1]

(u) The **lowest terminal or socket** of any **internal (wall-mounted or floor-mounted) MDF** should not be less than **350 mm** from finished ground or floor level. [AS/CA S009:2013 Clause 13.7.2.2]

Lighting

(v) The MDF shall be provided with **adequate lighting** (a light intensity of 500 lux at a height of 1 metre above ground or floor level is considered to be adequate lighting). [AS/CA S009:2013 Clause 13.9]

Marking

(w) The MDF shall:

- have the **verticals** clearly marked **alphabetically from left to right**, omitting the letters "I" and "O"; and [AS/CA S009:2013 Clause 13.12 (a)]
- have the range of **jumperable terminations** within each vertical indicated **numerically in ascending order** from the lowest module position (unless clearly labelled otherwise) starting from numeral "1". [AS/CA S009:2013 Clause 13.12 (b)]

Note: A partially equipped MDF should be marked so as to allow expansion of the MDF without the need to redesignate verticals or renumber existing terminations. [AS/CA S009:2013 Clause 13.12 Note]

Earthing

(x) **Provision** shall be made for any metallic enclosure, frame or backmount to be **earthed** (e.g. by providing suitable holes, screws, bolts or clamps for connection of earthing conductors). [AS/CA S009:2013 Clauses 12.5 (b), 13.2 (a)]

Connections

(y) The MDF shall be capable of terminating the **carrier's standard termination modules** on the carrier's side of the MDF (KRONE – manufactured by TE Connectivity – in Telstra's case). [AS/CA S009:2013 Clause 13.11]

(z) 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. [AS/CA S009:2013 Clause 5.13]

(aa) A cabling provider shall **not** make a connection on the carrier side of the MDF unless a pair on the carrier side has been tagged, labelled, recorded or otherwise specified by the carrier for the customer service that is to be connected. [AS/CA S009:2013 Clause 13.13.1]

(bb) A cabling provider may make or alter any connection on the customer side of the MDF. [AS/CA S009:2013 Clause 13.13.2]

(cc) A cabling provider may remove a redundant cross-connection ("dead jumper") from the carrier side of the MDF if all reasonable steps have been taken to ensure that a working service is not inadvertently disconnected. [AS/CA S009:2013 Clause 13.13.3]

Records

(dd) Suitable **cable records** shall be provided that enable cables and cross-connections to be correctly identified and connected. [AS/CA S009:2013 Clauses 12.3.1 (a), 13.2 (a)]

(ee) The records shall be **legible and updateable**. [AS/CA S009:2013 Clauses 12.3.1 (b), 13.2 (a)]

(ff) Terminations and cross-connections used for any line providing **power feeding** exceeding 60 V d.c. or 42.4 V a.c. peak (30 V a.c. r.m.s.), but excluding a line that occasionally carries interrupted ring voltage (e.g. a standard telephone line), shall be **clearly identified** in the records and by appropriate labelling or marking of the MDF connection modules. [AS/CA S009:2013 Clauses 12.3.2, 13.2 (a)]

5 TELSTRA REQUIREMENTS FOR CUSTOMER MDFs

General

Additional Telstra requirements for customer MDFs are summarised below. These are to ensure that:

- the MDF can be safely accessed by Telstra workers;
- the customer's safety is not unduly put at risk;
- the safety and integrity of Telstra's network and services can be reasonably assured; and
- the length of cabling from the building entry point to the MDF is minimised.

Location

(1) The MDF should be located in a **common service area** within **20 metres** radial distance of the Telstra **building entry point**, subject to the following additional considerations:

- The MDF should be installed **above known flood levels**.
- The MDF should be **co-located with the building LV electrical switchboard** to meet bonding/earthing requirements, as long as there is no earth potential rise (EPR) hazard.
- The MDF should **not** be installed in an **HV** electrical switch room or near an **HV** transformer.

Refer to 6.1.1, 6.1.2 and 6.1.3 of this Document.

(2) The MDF must **not** be located in an **individual tenancy** in multi-tenant premises **unless** the MDF is **solely for the use of that tenant**.

Refer to 6.1.4 of this Document.

Cable entrance facilities

(3) The **developer, builder, owner or customer** is required to provide, or arrange and pay for, the **building penetration** and suitable **tray, trunking or conduit** to support the Telstra lead-in cabling **from the building entry point to the MDF**. Facilities shared with other services are acceptable subject to the appropriate separations being maintained.

Refer to 6.4 of this Document.

Cable termination modules and backmounts

(4) Telstra's standard terminating system for customer premises is the KRONE Series 2 Disconnection Module, Profil. The MDF must include **sufficient module backmounts** on the Telstra side of the MDF to enable Telstra to fit the KRONE modules and connect the Telstra lead-in cable at the MDF. Telstra will **not** connect its lead-in cable to any other terminating system under any circumstances.

Note: KRONE is manufactured by TE Connectivity Ltd.

Refer to 6.6 and 6.7 of this Document.

(5) The **backmounts** used for the KRONE modules may be either the **Profil** or **turret** (notched) style.

Refer to 6.7 and 6.8 of this Document.

(6) Telstra services must be connected to the customer cabling by means of **jumpers**. Telstra will **not**:

- connect its lead-in cables to any modules that are **hard-wired** or **pre-jumpered** to other connection modules or customer cabling; or
- connect its lead-in cables to any **patch panel** or to any termination module that is hard-wired to a patch panel.

Refer to 6.9 of this Document.

Marking

(7) The customer side of the MDF should be marked in the same way as the Telstra side to avoid confusion, e.g. if the existing Telstra-side terminations are numbered from the bottom up, then the customer-side terminations should be numbered from the bottom up.

Jumpers

(8) No more than **one jumper** may be connected to any pair of terminals on **Telstra's side** of the MDF.

Refer to 6.12 of this Document.

6 CUSTOMER MDF INSTALLATION AND USAGE GUIDELINES

6.1 MDF location

6.1.1 General

While the MDF may be located either internally or on an external wall of the building, it should be installed inside the building for reasons of economy, reliability and security. Where the MDF is located externally, it must be installed in a suitable enclosure to protect it from the weather, access by children or unauthorised persons, and physical damage (e.g. vandalism). External MDFs are commonly locked by the owner or customer. In such cases, if it is not obvious where a key can be obtained to access the MDF, this should indicated by a durable notice on or beside the MDF.

The MDF should be located in the **same building as the customer**. An MDF should **not** be used to feed multiple tenants located in separate buildings. Refer to 0 (c).

Note: A single MDF may be used to connect multiple buildings occupied by the same customer unless the buildings are under separate leases or are likely to be sub-leased (see 6.1.4).

The MDF should be located in a **common service area** within **20 metres** radial distance of the Telstra **building entry point** subject to the following additional considerations:

- The MDF should be installed **above known flood levels**.
- The MDF should be **co-located with the building LV electrical switchboard** to meet bonding/ earthing requirements, as long as it will not be near any HV electrical equipment and there is no earth potential rise (EPR) hazard.

More information is provided below.

6.1.2 Proximity to HV electrical equipment

The MDF should **not** be installed in an HV electrical switch room or within **15 metres** of any HV transformer, whether either the MDF or the HV transformer is internal or external to the building.

6.1.3 Proximity to the LV electrical switchboard

Whether the MDF is located internally or externally, it should be installed **within a few metres** of the building LV electrical switchboard (i.e. the switchboard in/on the customer's building) to minimise the equipotential bonding conductor length for connection of lightning surge suppression (see 6.15).

6.1.4 Multi-tenant premises

In multi-tenant premises, the customer MDF should be located in a **common service area** of the **same building** in which the customer (tenant) is located.

The MDF must **not** be located in an **individual tenancy** in multi-tenant premises **unless** the MDF is provided **solely for the use of that tenant**.

Notes:

1. Apart from security and privacy concerns, the installation of a common MDF in an individual tenancy may create access problems for Telstra and other service providers, and may cause inconvenience to that tenant and to the other tenants who rely on that tenant's goodwill for connection and repair of their telecommunications services.
2. Telstra may refuse to connect a telecommunications service to any MDF that is located in a tenancy other than that of the customer being supplied with the service.

6.1.5 Earth Potential Rise (EPR) hazards

For safety reasons, an MDF must **not** be installed within an EPR hazard zone. The cabling provider must survey the premises for the presence of power poles, towers, transformers and substations (i.e. located in the street, within the customer's premises or within adjoining premises) to ensure that the MDF will not be installed within an EPR hazard zone.

As a general rule, the MDF should not be installed:

- within **40 metres** radial distance of the base of a steel lattice tower or metal or concrete pole supporting HV power lines of 220 kV or higher
- within **16 metres** radial distance of the base of a steel lattice tower, metal or concrete pole, or a wooden pole with a down-conductor to an earth electrode, supporting HV power lines of 66 kV or 132 kV
- within **15 metres** radial distance of:
  - a pole supporting HV power lines less than 66 kV and with any connections to underground power cable
  - a pole supporting an HV power transformer
  - a metal or concrete pole, or a wooden pole with a down-conductor to an earth electrode, supporting HV power lines less than 66 kV
  - a wooden pole supporting HV power lines with a pole-top switch and either an all-metal down-rod or an earthing conductor extending up the pole above the handle
  - a pad-mounted (ground level) HV power transformer
- within the minimum distance of a power generating station or a power distribution substation specified by the relevant power utility.

Refer to Appendix H of Australian Standard AS/CA S009 (Wiring Rules) or to Australian Standard AS 3835.1 for more information.

Where the entire building is within an EPR hazard zone (e.g. a power generating station or a power distribution substation), the lead-in cabling may need special isolation equipment to be fitted at the building entry point or telecommunications services may need to be supplied by means of optical fibre or wireless technology. In such cases, the cabling provider must liaise with Telstra, through the relevant power utility, for safe connection of telecommunications services.

6.1.6 General safety hazards

Notwithstanding anything contained in this Document or any other document, the MDF must not be installed in any location or in such a way that may put the health or safety of any person required to work on the MDF at risk. For example, an MDF should not be located in a vehicle driveway or vehicle parking area without the provision of suitable barriers to protect a person working on the MDF from being struck by a moving vehicle.

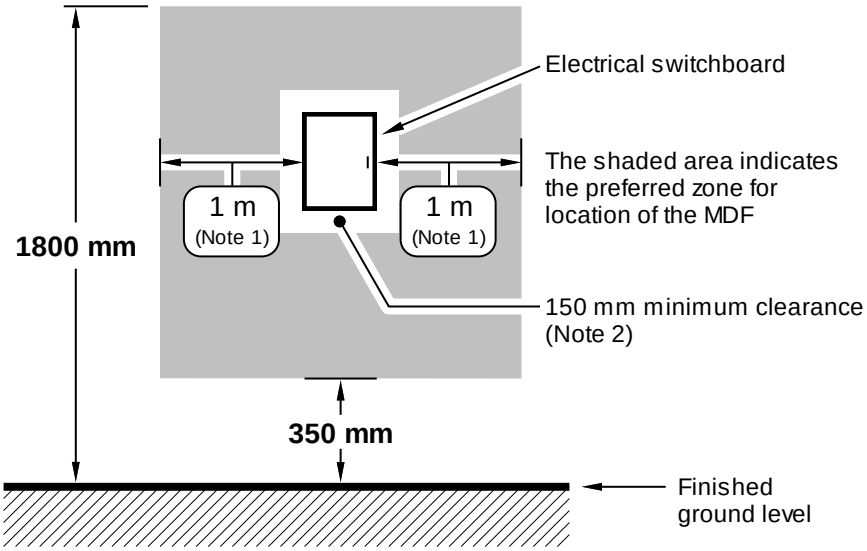
6.2 Access clearances

Suitable access clearances are required around the customer MDF to provide safe and convenient access to carriers, service providers and cabling providers. The access space is necessary to provide a person with sufficient head and shoulder room to terminate cables, test services and make cross-connections on the MDF. The area above, below and beside the MDF should not contain any protruding obstacles that may require any person to stoop or twist their body in order to gain access to cables or terminations within the MDF.

Where any MDF termination is installed at a height that requires the use of a ladder (this is only permissible for a floor-mounted or “island” MDF), additional clearance may be required around the MDF to allow positioning and climbing of the ladder safely and/or safe passage around the ladder.

Figure 2 to Figure 5 illustrate minimum and maximum heights and clearances recommended to ensure that the installation complies with the mandatory requirements of AS/ACIF S009 and to ensure safe and convenient access.

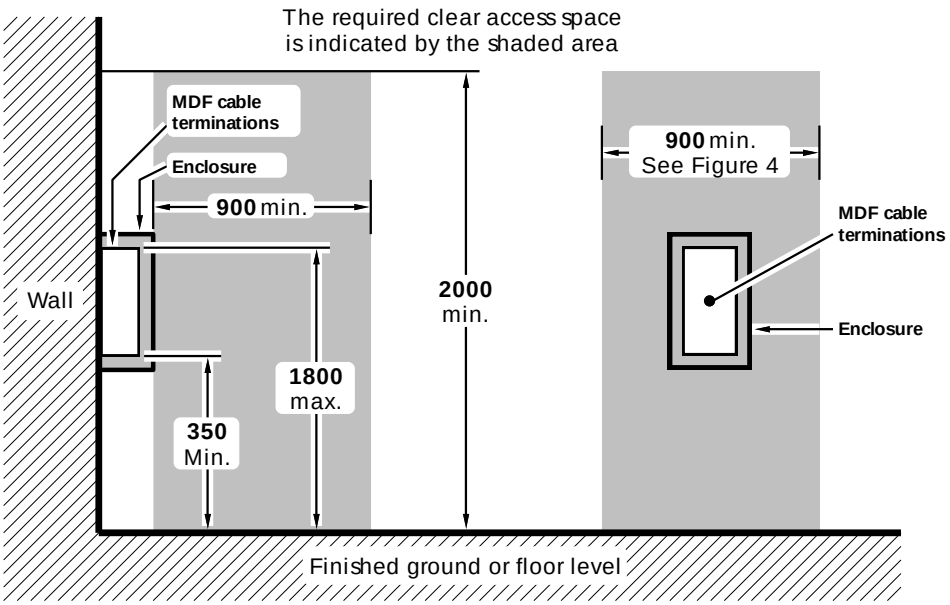
Figure 2 Installation zone for a wall mounted MDF on the external wall of a building [Figure D1 of AS/CA S009:2013]



Notes:

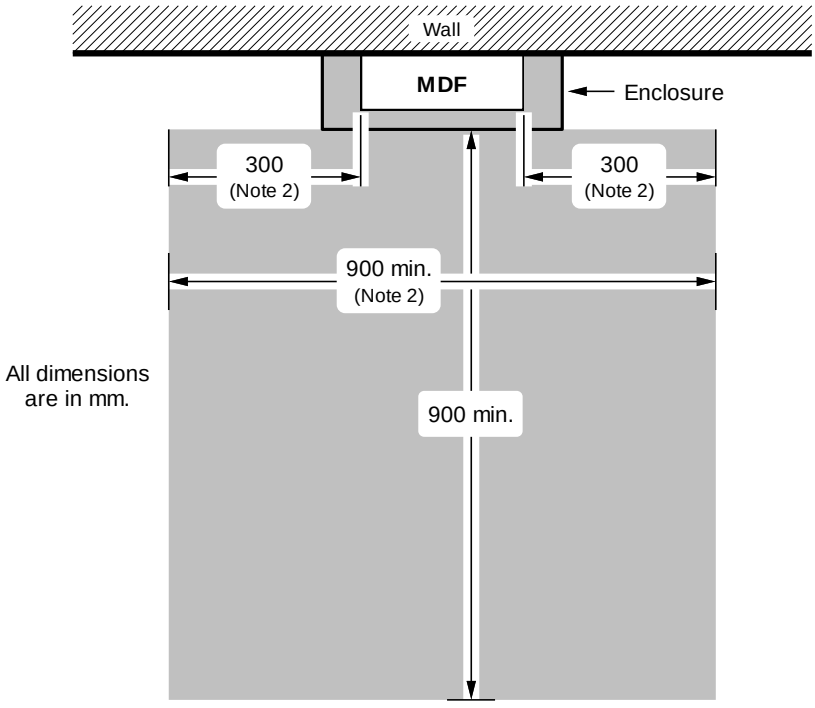
1. It is recommended that the MDF be installed within 1 metre of the electrical switchboard for ready location, access and to enable effective surge suppression to be provided. Care needs to be taken to avoid building fixtures such as downpipes, water pipes/taps, etc. and fences that adjoin the building.
2. The 150 mm clearance is an operational clearance (e.g. to allow for opening of the door/cover of the MDF or future expansion), and is not a safety requirement.

Figure 3 Access clearances for a wall-mounted MDF [Figure D2 of AS/CA S009:2013]



Side view All dimensions are in mm. **Front view**

Figure 4 Access clearances for a wall-mounted MDF [Figure D3 of AS/CA S009:2013]

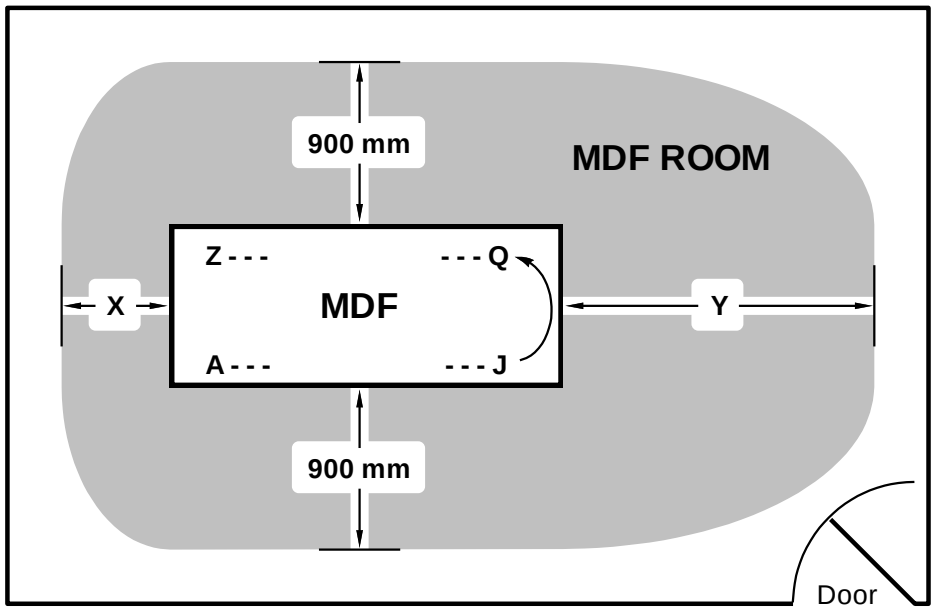


Plan view

Notes:

1. The shaded area indicates the space that should be kept clear of obstacles.
2. The 300 mm side clearance provides “shoulder room” for working on the MDF. The minimum required total clearance width in front of the device is 900 mm.

Figure 5 Access clearances for a floor-mounted ("island") MDF [Figure D4 of AS/CA S009:2013]



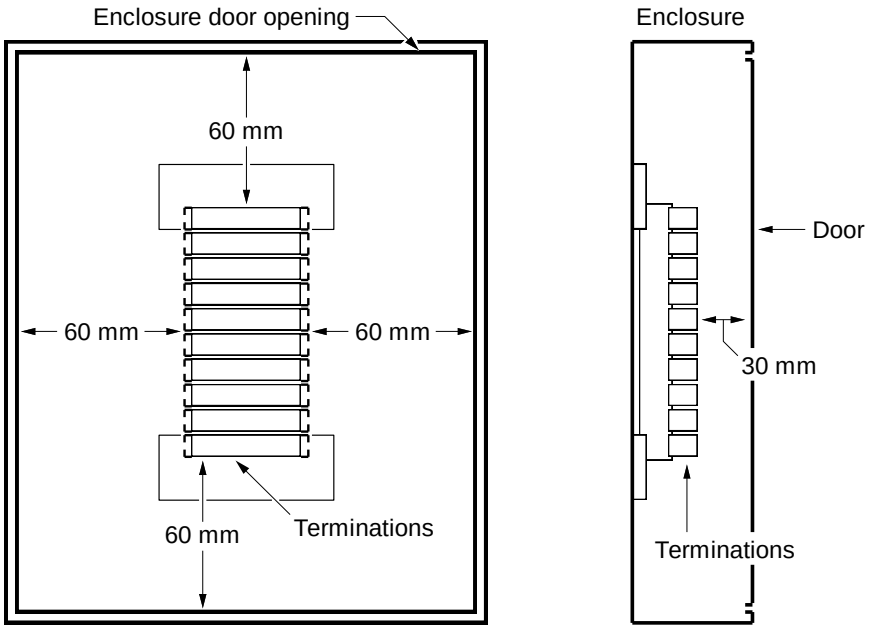
Notes:

1. Position the MDF within the room to obtain the required minimum clearances around it.
2. The fixed end clearance, marked "**X**", must be sufficient to provide "shoulder room" for working on the MDF, i.e. a minimum of 300 mm. However, sufficient clearance should be provided to enable ready escape from the vicinity under emergency conditions — a minimum distance of 600 mm is recommended for this purpose. If the MDF has cable terminations facing the end wall, a minimum distance of 900 mm is required.
3. The end clearance marked '"**Y**" should be sufficient to provide for MDF expansion, access and ready escape from the vicinity under emergency conditions — a minimum distance of 1200 mm is recommended.
4. A minimum frontal clearance of 900 mm working space from the vertical face of the termination side of the MDF and a minimum vertical clearance of 2 m from the walked-on surface are required.
5. The MDF verticals must be designated alphabetically from left to right (i.e. in an anti-clockwise direction) as shown. A gap should be provided in the vertical designations as indicated above (e.g. K-P) to allow for verticals to be added later without the need to redesignate the existing verticals.

6.3 Surge suppressor clearance

A minimum clearance of 30 mm is required between the front face of the Telstra termination modules and the inside face of the front cover or door of the MDF enclosure in the fully closed position. This clearance is to provide for fitting of gas arrestor magazines. See Figure 6.

Figure 6 Clearances within an MDF enclosure



Notes:

1. A minimum clearance of 30 mm is required in front of the Telstra modules to allow for fitting of surge suppression devices (this is requirement of the wiring rules).
2. Sufficient clearance is required around the termination modules to connect cables and run jumpers. While the wiring rules do not specify access clearances for this purpose, a minimum clearance of 60 mm is recommended between the modules and the sides of the MDF enclosure to provide “finger access” to the jumpers at the sides of the modules.

6.4 Cabling between the building entry point and the MDF

For internal MDFs, the building owner should provide suitable lead-in cable entry facilities and a suitable pathway for running the lead-in cable between the “building entry point” (cable entry point) and the MDF. Facilities such as cable trays or trunking shared with other services are acceptable subject to the appropriate separations being maintained.

Note: Telstra requires the internal lead-in cabling to be separated from other services in accordance with the relevant requirements of sections 8, 9 and 16 of the wiring rules (AS/CA S009), which may be downloaded from the Communications Alliance website http://www.commsalliance.com.au/Documents/CE-Standards.

6.5 Home or small office networking distributor

For a **new** individual home (single dwelling or individual ground-level home unit) or small business having similar characteristics, if a networking distributor (patch panel) is to be installed, the Telstra lead-in cable should be connected to a Telstra NTD at the building entry point, and tie cables should be installed between the NTD and the patch panel in accordance with Australian Standard AS/NZS ISO/IEC 15018, *Information technology — Generic cabling for homes*, and Standards Australia Handbook HB 252, *Communications Cabling Manual Module 3: Residential communications cabling handbook*. This principle is illustrated in Figure 7 (a).

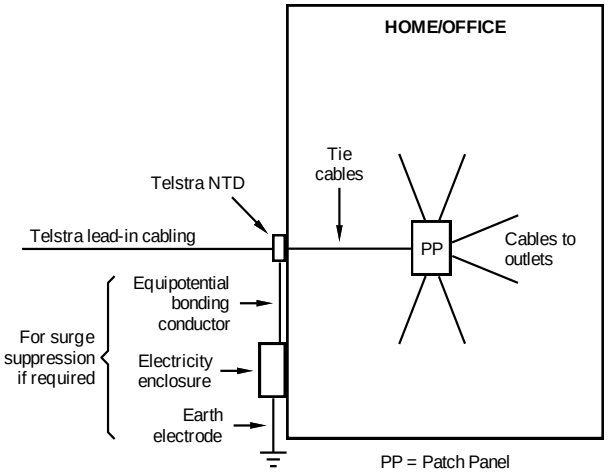
Note: Registered cabling providers are authorised to install the NTD under the terms and conditions of Telstra Document No. 012882, *Alteration of Telstra facilities in homes & small businesses — Information for cabling providers*, (otherwise known as "A2A" — "Authorisation to Alter") and Document No. 012688, *Telstra Network Termination Device (NTD) — Information for cabling providers*. These documents may be downloaded from the Telstra Smart Community website (http://www.telstra.com.au/smart-community/builders/).

Where home/office networking is to be installed in an **existing** building and it is impractical to retrofit a Telstra NTD, the patch panel must be cabled from the first telecommunications outlet ("first TO"), which may be relocated by the cabling provider to a position adjacent to the patch panel, in accordance with Telstra Document No. 012882. Alternatively, the lead-in cable may be connected to a separate MDF from which tie cables may be run to the patch panel. This principle is illustrated in Figure 7 (b).

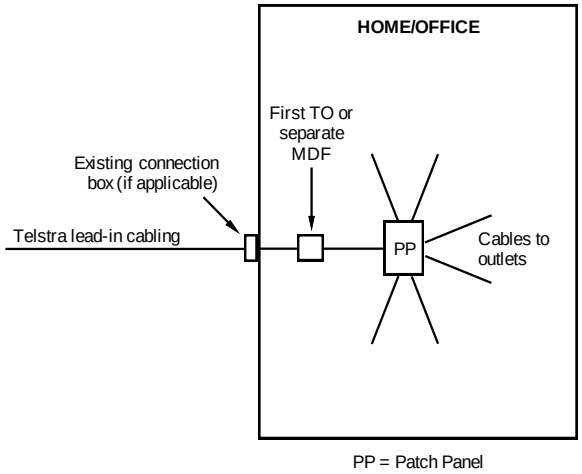
Note: Telstra lead-in cabling must be connected to any customer MDF by Telstra. Non-Telstra cabling providers are not authorised to do this. However, the MDF itself is to be installed by the cabling provider.

Figure 7 Connection of a home or small office networking distributor (patch panel)

(a) Connection via a Telstra NTD (preferred)



(b) Connection via the first TO or a separate MDF



Notes:

1. The patch panel (PP) enables end-users to change service and telecommunications outlet (TO) connections to meet their particular requirements. The patch panel should be connected via a Telstra NTD, as shown in (a), which is in accord with Australian Standard AS/NZS ISO/IEC 15018 and Standards Australia Handbook HB 252. Alternatively, the patch panel may be connected via the "first TO", which may be relocated to a position adjacent to the patch panel, or via a separate MDF, as shown in (b).
2. Telstra lead-in cable shall **not** be connected directly to the patch panel unless it meets all wiring rules and Telstra requirements for an MDF (see section 4 and section 5).

6.6 MDF design

6.6.1 General

There are numerous brands and styles of customer MDFs available. Smaller MDFs may be supplied as a complete unit whereas larger MDFs are usually assembled on site using ACMA-compliant components. In the latter case, products must be selected and used according to the relevant requirements for MDFs of Australian Standards AS/CA S008, *Requirements for customer cabling products*, and AS/ACIF S009, *Installation requirements for customer cabling (Wiring rules)*.

The cable terminating system used on the customer side ("B" side) of the MDF may be any ACMA-compliant type. However, the terminating system used on the carrier side ("A" side) of the MDF must be the carrier's standard terminating system for customer MDFs (KRONE Series 2 Profil-mount Disconnection Modules in Telstra's case). Other carriers may use different terminating systems, so it is important to ascertain what terminating systems they use for customer MDFs.

Notes:

1. Telstra uses assorted cable terminating systems for various applications. For example, Telstra uses different terminating systems in exchange MDFs, roadside cabinets and pillars. However, only KRONE (TE Connectivity) Series 2 Disconnection Modules (Profil) may be used for terminating Telstra lead-in cables on customer MDFs.
2. While the installer of the customer MDF must ensure that the MDF is capable of terminating KRONE Series 2 modules on the Telstra side of the MDF (e.g. by providing suitable backmounts), the termination modules themselves will be supplied and installed by Telstra.

Where the "B" side of the customer MDF is not KRONE or KRONE compatible, it may be necessary for the building owner, manager or customer, as applicable, to make suitable terminating tools and usage instructions available at the MDF for use by carriers and service providers or, alternatively, arrange for their own cabling provider to connect service jumpers to the "B" side of the MDF as and when required (see 6.11 on page 23).

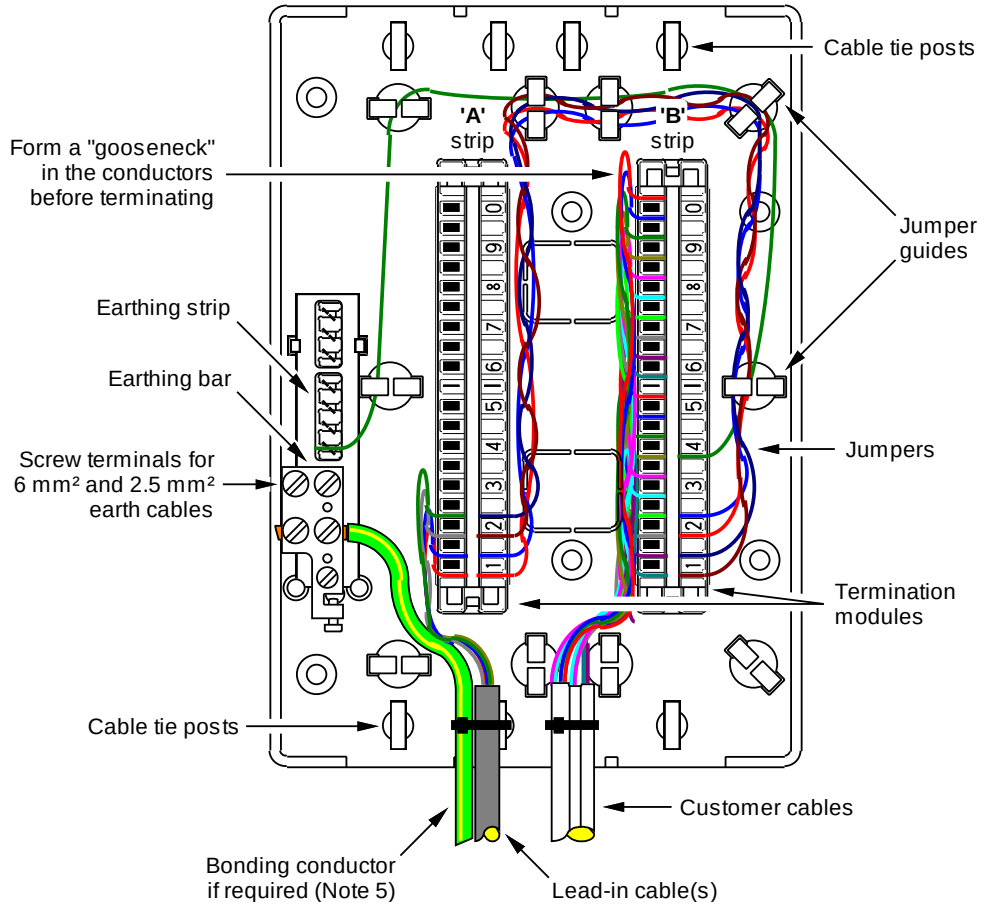
6.6.2 Small MDFs

The KRONE 10-pair MDF illustrated in Figure 8 is a popular MDF for termination of lead-in cable up to 10 pairs and is an example of a style of MDF that uses vertically orientated termination modules.

With this particular MDF, the "A" side termination module is supplied with it (the module is moulded into the base). The MDF has limited capacity for termination of customer ("B" side) cables, and its use should be limited to simple network interfacing applications, such as shown in Figure 7 (b), or for cases where no more than 8 to 10 customer cable pairs are ever likely to be terminated. Figure 8 shows how cables and jumpers are terminated on this MDF.

Other types of MDF that use the same vertical module mounting arrangement (e.g. Madison Model 30 MDF) are similarly terminated.

Figure 8 10-pair KRONE MDF



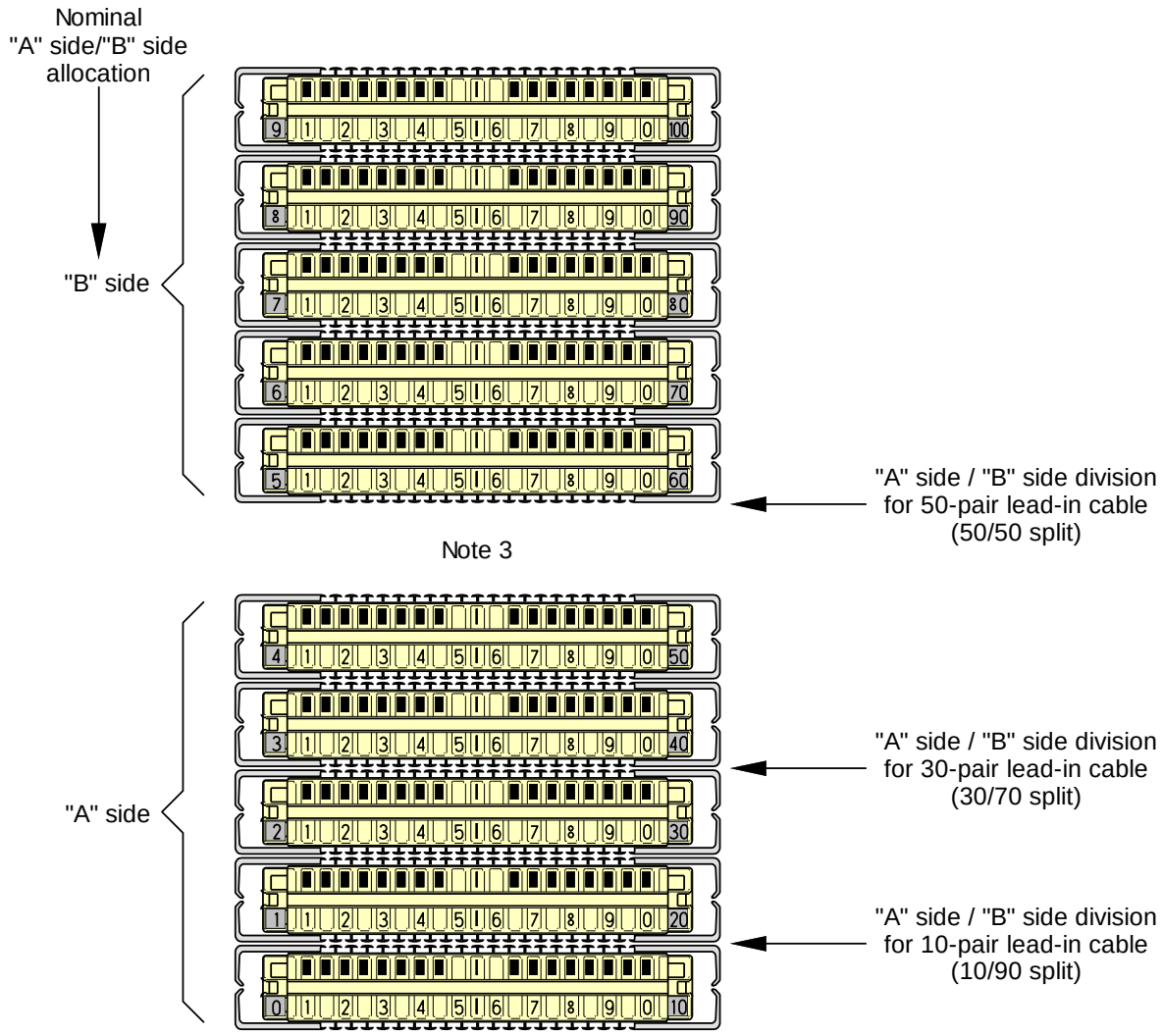
Notes:

1. This particular MDF is for internal (indoor) use only but may be used outdoors if housed in a suitable weather resistant enclosure. It has a deep cover to accommodate a KRONE arrestor magazine. The 10-pair KRONE MDF should not be confused with the KRONE 20-pair Final Distribution Point, which looks similar but has a shallow cover and no metal strap between the earth bar and the “A” side module for an arrestor magazine. The 20-pair FDP must **not** be used as an MDF.
2. The “A” strip is reserved for carrier cables. The “B” strip is used for connection of customer cables. This MDF has no room for expansion and should only be used where no more than 8 to 10 customer cable pairs are ever likely to be terminated.
3. Terminate cables on the left (unnumbered) side of the module, and connect jumpers on the right (numbered) side of the module, as shown above. Leave a “gooseneck” in the cable conductors to allow for disconnection and re-termination of conductors for testing purposes. Leave sufficient slack in the jumpers to enable them to be traced.
4. A genuine KRONE terminating tool should be used for terminating cables on this MDF. Other brands of tool should **not** be used. Use of a non-KRONE tool may damage the modules.
5. The earthing bar of the MDF should be equipotentially bonded to the electrical earthing system in accordance with Australian Standard AS/CA S009 (wiring rules) to facilitate the installation of effective surge suppression for the protection of the end-users of the telecommunications services. See 6.16 (page 30) for more information.

MDFs are available as frame assemblies on which the required number of termination modules may be mounted. These are available for indoor or outdoor use. Some MDFs used for termination of lead-in cables of 10 to 50 pairs may only contain one backmount or “vertical” for mounting of both “A” side and “B” side termination modules. In such cases, the demarcation between the “A” side and the “B” side of the MDF may be less obvious than with larger MDFs that have several verticals.

A typical single vertical MDF is illustrated in Figure 9.

Figure 9 Typical “A” side and “B” side allocations for an MDF with a single “vertical”



Notes:

1. The “A” side of the MDF comprises the termination modules or backmounts allocated for termination of carrier cables. The “B” side of the MDF comprises the modules allocated for connection of customer cables.
2. The “B” side modules, earthing conductors and the MDF itself (backmount, enclosure, etc.) are supplied and installed by the cabling provider. The “B” side modules may be any ACMA-compliant type. The “A” side modules are supplied, installed and owned by the carrier (e.g. Telstra). Telstra modules will be KRONE Series 2 Disconnection Module, Profil. Customer cables must **not** be terminated on these modules even if they have spare capacity.
3. A vacant module position should be left between the “A” side and “B” side modules for physical demarcation between the two sides. Alternatively, use this module position for mounting of a label or test module.

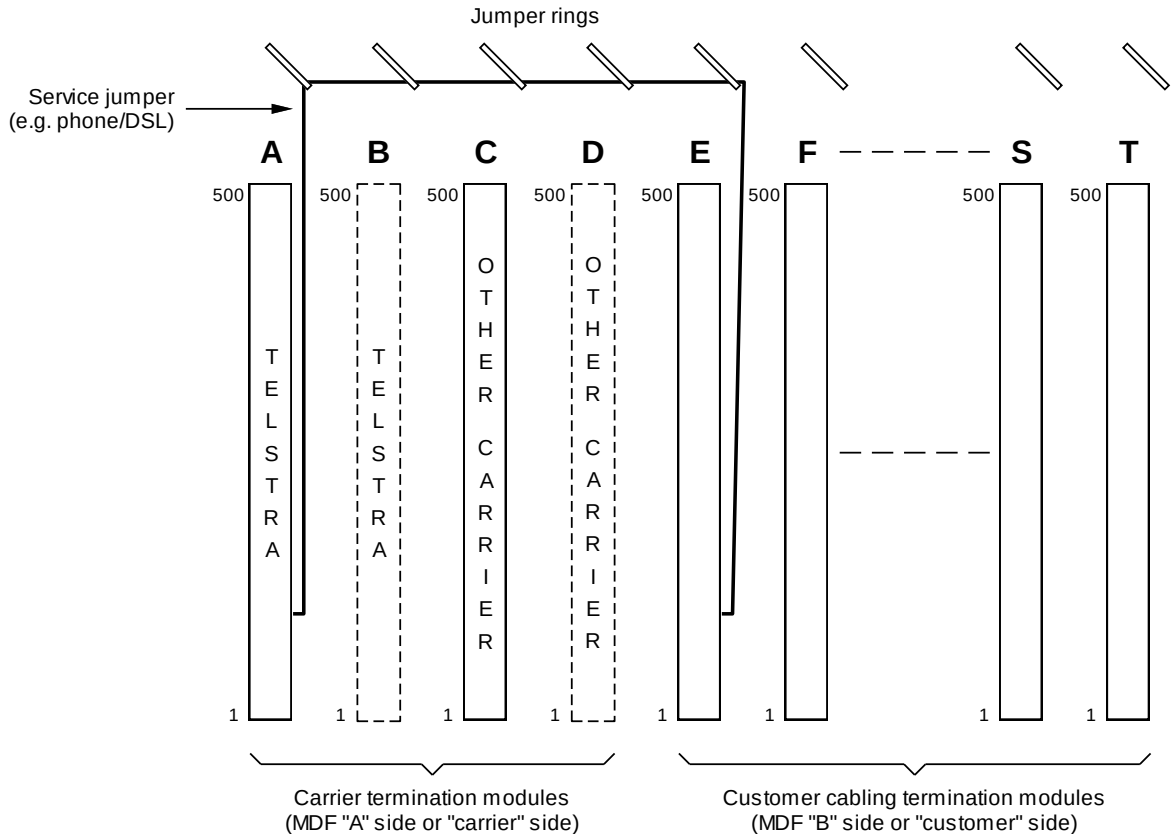
6.6.3 Bay-frame MDFs and MDF racks

Larger wall-mounted (“bay-frame”) or freestanding (“rack-mounted”) MDFs have two or more verticals for termination of carrier cables and customer cables. The lead-in cables generally terminate on separate verticals to the customer cables. While the carrier side of the MDF is often referred to as the “A” side of the MDF, lead-in cables do not actually have to be terminated on the “A” vertical. Verticals allocated for termination of lead-in cables may be any suitable vertical within the MDF. It is not uncommon for lead-in cables to terminate on a vertical in the middle or on the right side of the MDF or to be spread among a number of verticals (e.g. where lead-in cables are added some time after the initial MDF installation).

Fitting and termination of lead-in termination modules on larger MDFs are the same as for smaller MDFs (see 6.8).

For information about obsolete solder-tag MDFs, see 6.17 on page 32.

Figure 10 Typical bay-frame MDF layout



Notes:

1. While it is preferred that the network terminations be at the left-hand end of the MDF, this is not always achievable and by no means essential. Nevertheless, verticals should be selected, where possible, such that all of a particular carrier's verticals/modules are adjacent whether or not they also happen to be adjacent to the other carrier's verticals/modules.
2. In the above example, verticals A + B and C + D would be set aside for Telstra and other carriers' lead-in cables and termination of each carrier's network equipment.

6.7 Cable termination modules

It is a wiring rules requirement for the MDF to be capable of accommodating the carrier's standard cable termination modules on the "A" side so that the carrier can install these modules in the MDF and terminate the lead-in cable on them. Telstra's standard cable termination module for use on customer MDFs is as follows:

KRONE Series 2 Disconnection Module (1-0), Profil Mount, 10-pair,
Telstra serial/item 537/171, TE Connectivity Product No. 6468 5 043-10 (Box of 10)

This module will mount on either a Profil (rod) or turret (notched) style KRONE backmount (see 6.8) and will terminate 0.40 mm to 0.64 mm diameter solid copper conductors. It is not suitable for terminating 0.90 mm diameter conductors.

Telstra will **not** agree to terminate its lead-in cable on any other type of connection module.

The installer of the MDF should ensure that sufficient backmounts are provided for Telstra to be able to terminate all lead-in cable pairs. Additional capacity of at least 50% should also be provided for future expansion.

The connection modules for termination of Telstra's lead-in cable will be supplied and installed on the backmounts, and the lead-in cable terminated on the modules, by Telstra.

Non-Telstra cabling providers must **not** terminate Telstra lead-in cable on any MDF unless authorised in writing by a Telstra person with the authority to do so for that specific MDF.

6.8 KRONE backmounts

Two styles of KRONE backmount may be used for mounting the Telstra termination modules:

- rod ("Profil") type, as shown in Figure 17; or
- turret (notched) type, as shown in Figure 18.

Telstra does not have any preference for the style of backmount used — either type is suitable.

At least one type of small MDF, described in 6.6.2 and illustrated in Figure 8, includes both the "A" side and "B" side modules moulded into the base, such that none of the above backmounts is required.

6.9 Cross-connections (jumpers)

Telstra services must be connected to the customer cabling by means of jumpers. Telstra will **not** connect its copper twisted pair lead-in cabling to:

- any cable distribution device that does not use jumpers other than the Telstra NTD described in Telstra Document No. 012688;
- any modules that are hard-wired or pre-jumpered en masse to other connection modules or customer cabling; or
- any patch panel or any MDF termination module that is hard-wired to a patch panel.

Note: Jumpers provide Telstra some control over connection of network services to customer cabling to prevent such things as accidental connection of power feed pairs to a customer's telecommunications outlet (prohibited by Communications Alliance Code C559 Part 1) or accidental connection of a service intended for another customer or another address.

Service jumpers (i.e. jumpers from the "A" side to the "B" side of the MDF to connect a Telstra network service) are normally run by Telstra. However, Telstra may require the customer's service provider or cabling provider to run the jumper or to connect the "B" end of the jumper if:

- the "B" side pair has **not** been tagged or otherwise identified beforehand by the service provider or cabling provider; or
- the Telstra installer does not have a suitable terminating tool to connect the "B" end of the jumper on the "B" side termination modules, which may be a type that Telstra is not familiar with.

A non-Telstra cabling provider is permitted to run a service jumper to connect a new service if, and only if, the "A" side pair has been tagged or otherwise identified in writing by Telstra for the specific purpose of authorising a cabling provider to connect a jumper to that pair (see 6.11 on page 23).

A non-Telstra cabling provider may make or alter any connection on the "B" side of the MDF.

A non-Telstra cabling provider may remove a "dead" jumper (e.g. to free up a pair on the "B" side of the MDF) if all reasonable steps have been taken to ensure that a working service is not accidentally disconnected (see 6.13 page 25).

6.10 Connection of cables and jumpers on KRONE modules

The cabling provider shall terminate any jumper on a Telstra "A" side MDF module in accordance with the KRONE Technical Manual, using either of the following tools:

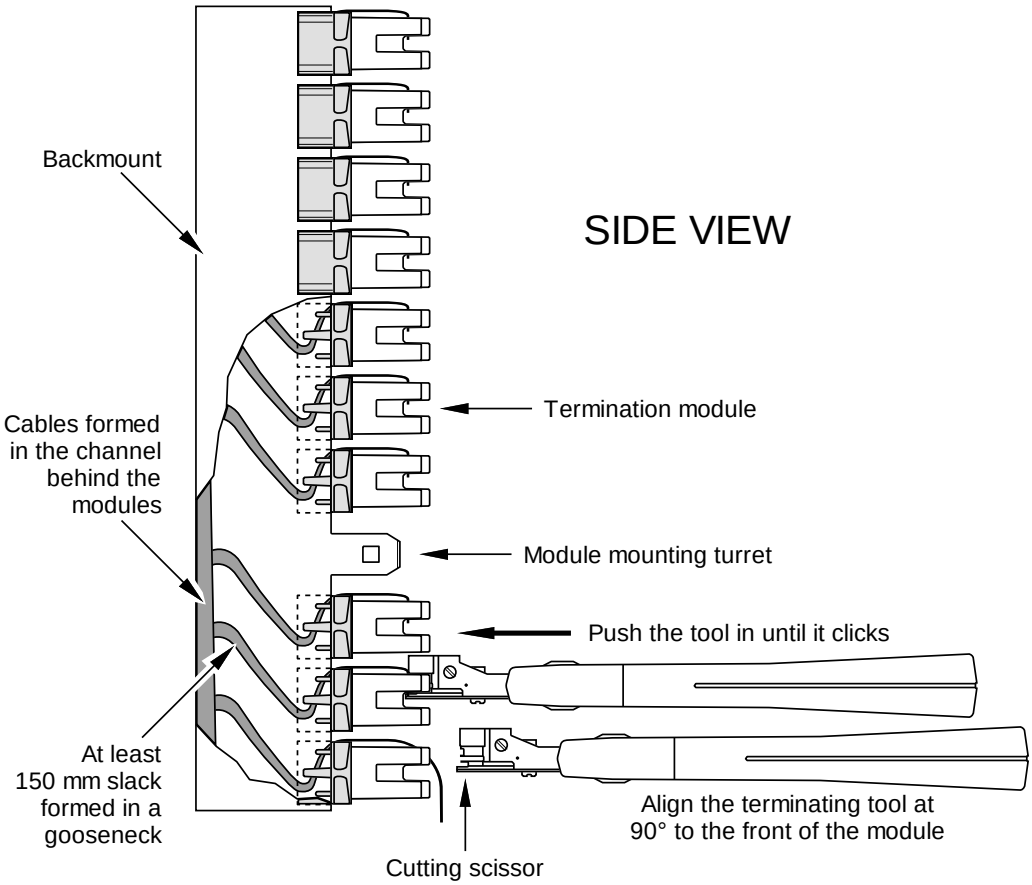
- KRONE "S" (Sensor) Connection Tool, TE Connectivity Product No. 6417 2 055-01; or
- KRONE Connection Tool, TE Connectivity Product No. 6089 2 003-00.

No other brand of tool may be used for termination of jumpers on the Telstra ("A" side) modules.

Guidelines for termination of cables and jumpers on KRONE modules are provided in Figure 11 and Figure 12.

Telstra lead-in cables must be terminated by Telstra.

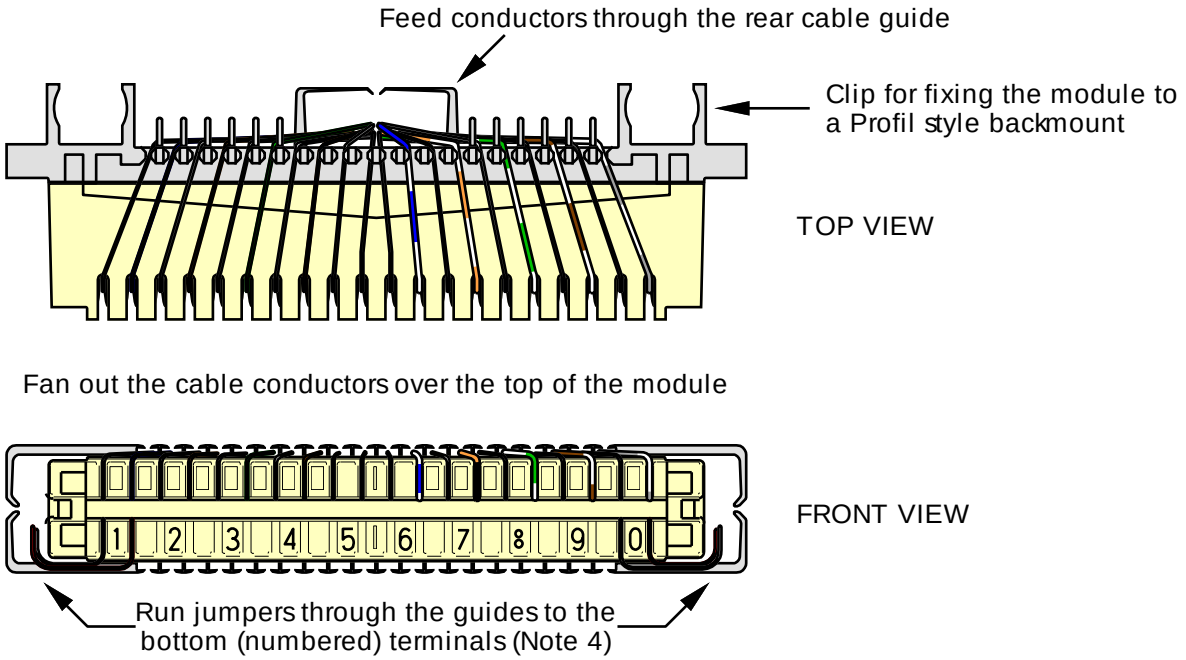
Figure 11 Termination of cables or jumpers on KRONE Series 2 modules



Notes:

1. The KRONE modules may be mounted on a turret style backmount (shown above) or a Profil (rod style) backmount (see Figure 17 on page 29).
2. Remove the cable sheath about 30 mm to 50 mm into the frame unit or backmount. Tie the cable sheath lightly to the frame unit or backmount using a suitable cable tie.
3. Leave at least 150 mm slack in the cable pairs in a "gooseneck" behind each module so that the module can be removed or swung out (Profil) from the backmount for inspection, maintenance, or to gain access behind the modules to add cables. Lightly bind or tie the conductors into 10-pair tails for termination on each module.
4. A genuine KRONE terminating tool should be used for terminating cables or jumpers on KRONE modules. Use of any other brand of tool may damage the modules.
5. Terminate cables from the bottom up, i.e. fan out and terminate the first 10 pairs on the bottom module, then fan out and terminate the second 10 pairs on the second module, and so on. Refer to Figure 12.

Figure 12 Termination of cables and jumpers on KRONE Series 2 modules



Notes:

1. Fan out the cable conductors over the top of the module as shown. Lightly bind or tie the conductors together in 10-pair bundles, and leave at least 150 mm slack in a gooseneck behind the module.
2. To terminate the conductor:
   - Place the unstripped conductor in the slot.
   - Insert the terminating tool over the conductor (align the tool with the slot).
   - Push the tool in until an audible click is heard. This indicates that the conductor has been correctly cut and terminated.
3. A genuine KRONE terminating tool should be used for terminating cables and jumpers on KRONE modules. Use of any other brand of tool may damage the modules.
4. Run jumpers through the jumper guides at the side of the module to the bottom (numbered) terminals. There is a jumper guide on each side of the module. With turret style backmounts, run jumpers for pairs 1-5 through the left hand guide, and run jumpers for pairs 6-10 through the right hand guide. However, for Profil (rod style) backmounts, all jumpers should be run through one guide only (either left or right) to enable the module to be swung (hinged) out.
5. Leave sufficient slack in jumpers (generally 50 mm to 100 mm) to enable them to be traced while still connected at both ends.

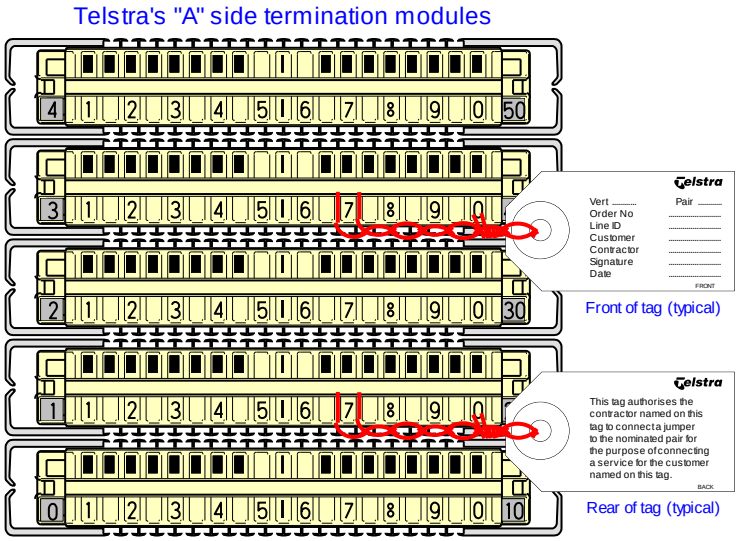
6.11 Tagging of service pairs

Telstra may tag an MDF pair on the carrier side for the purpose of authorising a cabling provider to connect a jumper to that pair. Alternatively, the tag may be secured to the end of a jumper that has been run to the customer side of the MDF for termination by the customer's service provider or cabling provider to the appropriate pair on the customer side of the MDF.

In the former case, the tag will be connected to the relevant pair by a short length of insulated jumper wire as illustrated in Figure 13. This jumper wire must be removed before the permanent jumper is connected to the pair. It is recommended that all jumpers on other distributors be run first and that the final connection is made on the carrier side of the MDF in case the jumper wire on the tag is intentionally short-circuiting the line for some reason.

The correct terminating tool must be used to terminate the jumper on either side of the MDF.

Figure 13 Typical tagging of a Telstra service pair on the "A" side of a customer MDF



Notes:

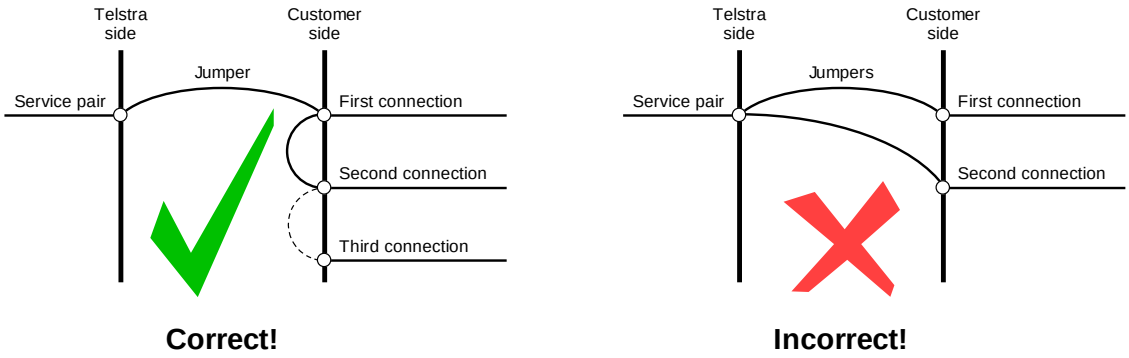
1. Telstra may tag the service pair on the "A" side MDF for the purpose of authorising a cabling provider to connect a jumper to that pair. Alternatively, Telstra may secure the tag to the end of a jumper that has been run to the "B" side of the MDF for termination by the service provider or cabling provider on the appropriate "B" side pair.
2. The tag should contain sufficient details to ensure the correct service will be connected to the correct customer.

6.12 Double jumpering

Telstra does not support connection of more than one jumper to any terminals on its termination module.

If a service is to be double-jumpered at the MDF, e.g. for access at different locations in the building (either permanently or temporarily while the customer is moving from one part of the building to another), the double connection must be made on the **customer's side** of the MDF as shown in Figure 14. Make the permanent jumper connection to the customer side first, then make the temporary connection over the top of the permanent jumper (assuming that double terminations are supported by the type of module used) so that the temporary jumper may be removed without disturbing the permanent jumper.

Figure 14 Double-jumpering of a service at the MDF



Notes:

1. Telstra does not support double-jumpering on its termination modules.
2. Where any service is to be double-jumpered, the double-connection must be made on the customer's side of the MDF as shown at left. If more than two connections are required, the service should be double-jumpered from the second connection as indicated.
3. Most termination modules are not designed to support connection of more than one conductor per insulation displacement connector (IDC) tine.

6.13 Disconnection of dead jumpers

6.13.1 General

It is standard Telstra practice to leave jumpers for cancelled services in-situ within any MDF to provide the opportunity for the services to be taken up "in place" at a reduced connection charge by an incoming customer. Nevertheless, not all cancelled services are taken up "in place", and eventually old jumpers for cancelled services (called "dead" jumpers) may accumulate to a stage where they clutter up the MDF and tie up spare pairs in the cables connected on the customer side of the MDF. It then becomes necessary to identify and remove dead jumpers to free up pairs in the customer cabling.

A cabling provider may remove dead jumpers from the carrier and customer sides of the MDF as long as all reasonable steps have been taken to ensure that a working service is not inadvertently disconnected. Note, however, that cabling providers are not permitted to remove or alter permanent cabling on the carrier's side of the MDF, e.g. lead-in cable. The following guidelines have been developed to assist cabling providers in identifying and removing dead jumpers.

6.13.2 Identifying dead jumpers

In identifying and removing dead jumpers, the cabling provider should not rely solely upon the MDF records or other distributor records to identify or determine the status of a service or jumper. Service identification, and the termination points of each service, should be determined by physically tracing jumpers and distribution cable pairs back to the MDF from the customer end, i.e. starting from the floor distributor or last distributor, as applicable.

Due to the high risk of disrupting important circuits, the status of a jumper, i.e. whether it is working or dead, should not be checked by means of a low impedance test device, e.g. buttinski, without first taking steps to determine with a good degree of confidence that it is not a data circuit or a physical bearer for line multiplexing equipment. Even then the test may be inconclusive in many cases due to the incidence of physical working pairs which may not exhibit the obvious signs of an active pair, i.e. some working pairs have no dial tone or measurable voltage across the pair. Examples are:

- incoming telephone lines (as distinct from both-way or outgoing lines)
- some unconditioned local loop (ULL) services
- naked DSL services (these may be supplied via ULL)
- 4-wire cailho lines (e.g. amplified circuits, E&M tie lines, 2048 kbit/s digital bearers)
- some "private" lines (e.g. used as virtual circuits)
- switched circuits (i.e. circuits which are only active when switched through from the carrier's telephone exchange or customer equipment at the premises).

A method for checking existing jumpers and records is as follows:

(a) The on-site records for the customer's last cable distribution point (e.g. floor distributor) should be consulted, and cable terminations and termination hardware should be checked for consistency with the cable records. If this physical check is positive, those services recorded as telephone services may be verified with a buttinski or a voltmeter, as appropriate.

Notes:

1. Some circuits, such as incoming lines or indial trunks, will not provide dial tone when looped.
2. Incoming lines may not exhibit a voltage across the line pair unless an incoming call is in progress.
3. Indial trunks will not usually exhibit a voltage across the line pair unless connected to an indial circuit at the PABX, i.e. the line voltage originates from the PABX, not the public telephone exchange.
4. Services recorded as non-telephone, e.g. ULL, DSL, data, teleprinter, telemetry, private line or bearer circuits, must not be checked by use of a low impedance test device such as buttinski or analogue multimeter. Such services should be physically traced, as far as is practicable, to the equipment to verify the correctness of the records. The records must be verified to the carrier side of the MDF by the above process, including physical tracing of the jumpers where necessary.
5. Where the cable records are missing or suspect, new records should be reconstructed to the extent necessary by physical tracing of cables and jumpers.

(b) Services/pairs should be physically traced back towards the MDF through all intermediate distribution points, where applicable. This may be achieved by checking of cable records against the termination hardware and physical tracing of jumpers from the "B" side to the "A" side of each distributor starting at the distributor closest to the customer.

Note: It should not be necessary to re-test working pairs with a buttinski or similar device at intermediate distribution points unless the records are suspect.

(c) The above process should be repeated at the MDF.

(d) If the MDF records are missing or not consistent with the actual plant, new records should be constructed by physical tracing of cables and jumpers. Where necessary, Telstra may agree to supply replacement "A" side MDF records using Telstra's external plant records, at appropriate charges.

6.14 MDF records

The MDF records are supplied by the installer of the MDF. The maintenance and safekeeping of these records are the responsibility of the building owner, manager or customer, as applicable. The MDF records may be stored electronically and/or maintained off site. However, in such cases there should be a hard copy of the records available at the MDF and/or a notice at the MDF indicating where or how the records can be accessed.

Telstra will enter lead-in cable details in the MDF cable records when the lead-in is terminated on the MDF, if the records are available. The details normally include the number of pairs (e.g. "100 pair lead-in cable") and the corresponding "O" side or "main" side pair designations. The lead-in cable details may be entered in either permanent (waterproof) ink or in pencil.

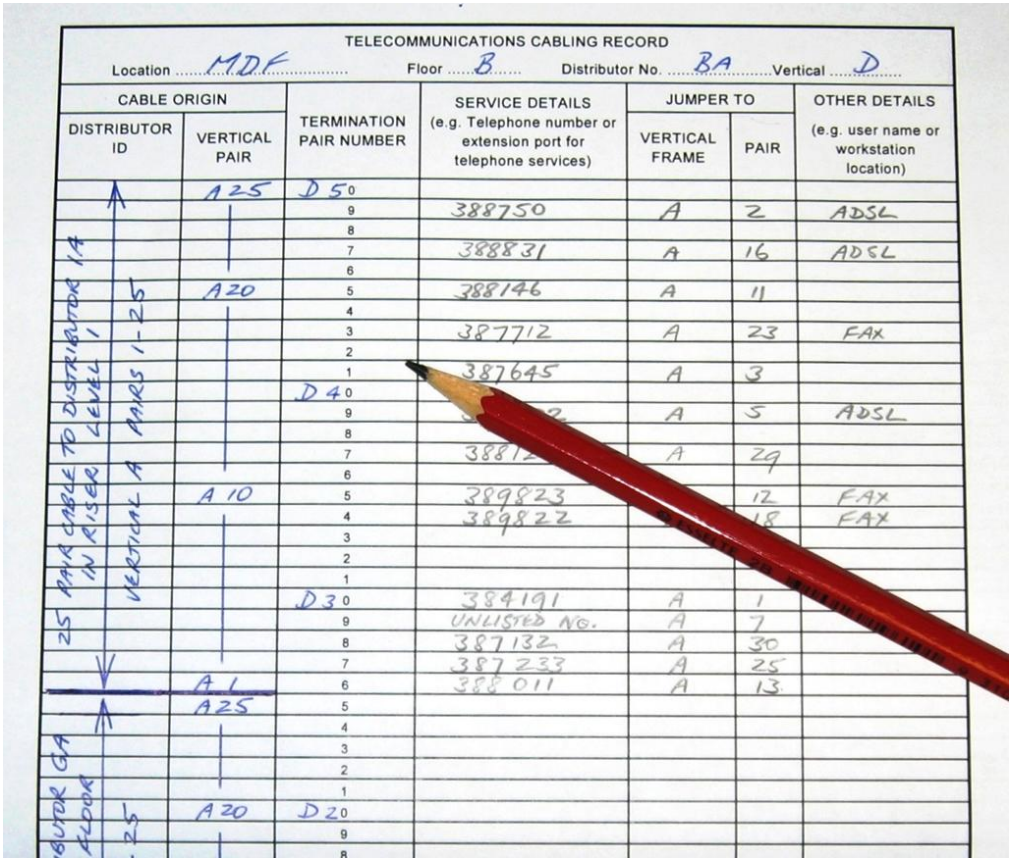
Telstra will also enter service and cross-connection (jumper) details in the MDF cable records, if available, as and when each service is connected on-site by Telstra. If Telstra authorises a cabling provider to do the service cross-connection (e.g. by tagging the "A" side of the MDF as described on page 20), Telstra will rely on that cabling provider to enter the cross-connection details in the cable records — however, the service details will be entered on the "A" side records by Telstra, where appropriate (see Notes).

Notes:

1. Telstra will not make a special visit to the premises to enter or adjust MDF records if a customer takes up an in-place service or cancels a service.
2. Unlisted numbers or non-essential information should not be entered in the cable records by either Telstra or the cabling provider.

Medium to soft lead pencil should be used to enter service identification and cross-connection details, i.e. HB, B or 2B. Hard pencil such as H, 2H or 4H must **not** be used.

Figure 15 Typical customer MDF records



TELECOMMUNICATIONS CABLING RECORD

Location MDF Floor B Distributor No. BA Vertical D

CABLE ORIGIN		TERMINATION PAIR NUMBER	SERVICE DETAILS (e.g. Telephone number or extension port for telephone services)	JUMPER TO		OTHER DETAILS (e.g. user name or workstation location)
DISTRIBUTOR ID	VERTICAL PAIR			VERTICAL FRAME	PAIR	
	A25	D50				
		9	388750	A	2	ADSL
		8				
		7	388831	A	16	ADSL
		6				
	A20	5	388146	A	11	
		4				
		3	387712	A	23	FAX
		2				
		1	387645	A	3	
		D40				
		9	[illegible]	A	5	ADSL
		8				
		7	3881[illegible]	A	29	
		6				
	A10	5	389823		12	FAX
		4	389822		18	FAX
		3				
		2				
		1				
		D30	384191	A	1	
		9	UNLISTED NO.	A	7	
		8	387132	A	30	
		7	387233	A	25	
	A L	6	388011	A	13	
	A25	5				
		4				
		3				
		2				
		1				
	A20	D20				
		9				
		8				

Note: Details of the permanent cabling may be entered in the MDF record book in permanent (waterproof) ink or in pencil. However, service identification and cross-connection details should be entered in **pencil** (HB, B or 2B) so that they can be erased and re-entered.

6.15 Earthing of MDFs

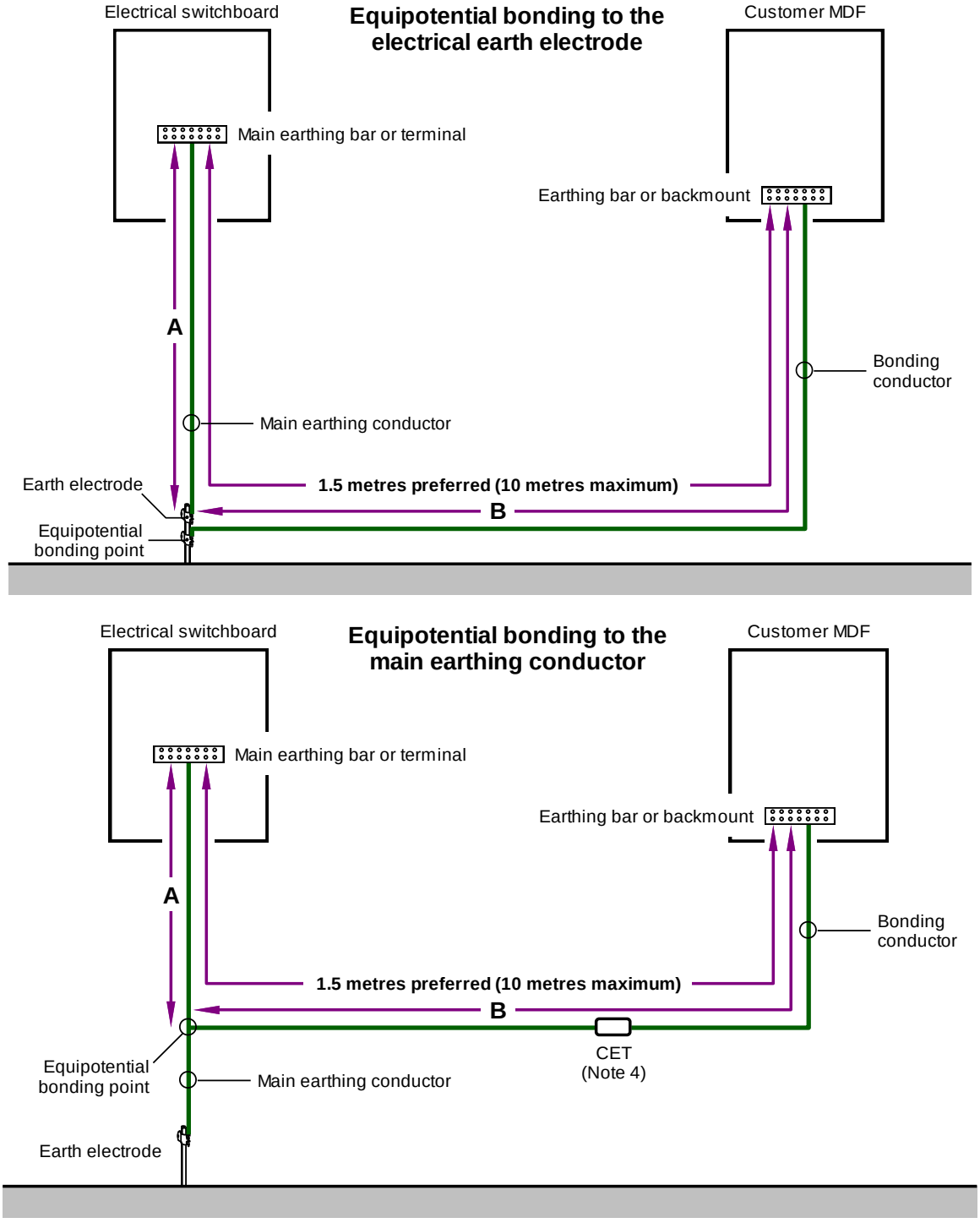
The lead-in termination backmounts of the MDF should be equipotentially bonded to the electrical earthing system of the building at which the MDF is located in accordance with Australian Standard AS/CA S009 (wiring rules) to facilitate the installation of effective surge suppression for the protection of the end-users of the telecommunications services.

For surge suppression purposes, the equipotential bonding must be made to the electrical switchboard **in the same building as the end-user**, otherwise the surge suppression will be ineffective. The MDF should be located in the same building as the customer in accordance with 0 (c) (page 6).

The total length of conductor between the MDF backmounts and the earthing bar or terminal in the building electrical switchboard should be no more than 1.5 metres where practicable, but must not exceed 10 metres in any case. This means if the equipotential bonding conductor is connected to the earth electrode, the length of the main earthing conductor between the electrode and the main earthing bar or terminal in the switchboard must be deducted from 1.5 metres (or 10 metres if 1.5 metres cannot be achieved) to determine the maximum allowable length of the bonding conductor. This is explained pictorially in Figure 16.

The bonding conductor may be connected to a suitable earthing bar or terminal at the MDF or it may be connected directly to the lead-in termination backmount. Where Profil backmounts are used, ensure that **both** mounting rods are earthed. Each lead-in termination module will be fitted with Profil earthing clips (by Telstra) as shown in Figure 20 where a KRONE arrestor magazine is used.

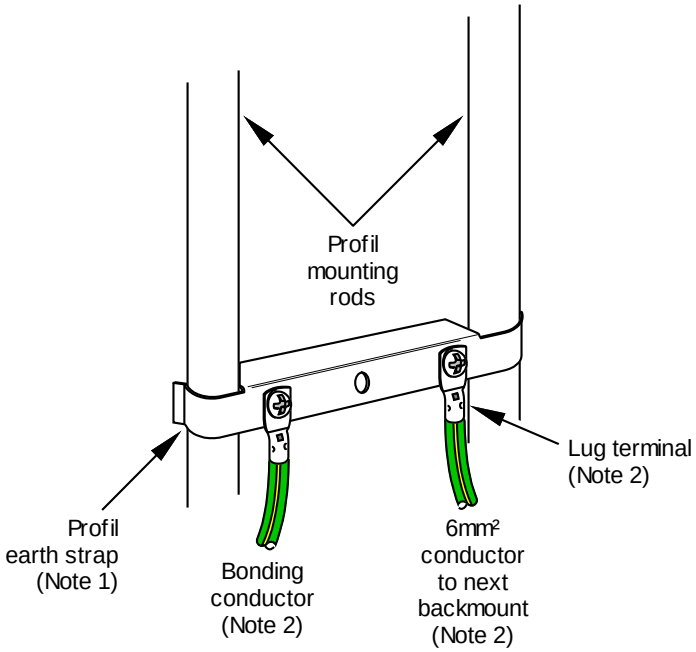
Figure 16 Calculating the maximum permissible length of the bonding conductor



Notes:

1. In each of the above cases, **A** = the length of the main earthing conductor between the main earthing bar or terminal and the equipotential bonding point, while **B** = the maximum allowable length of the bonding conductor between the equipotential bonding point and the MDF.
2. **B** = 10 – **A** (in metres). Thus if **A** = 1.5 metres, **B** = 10-1.5 = 8.5 metres. In most cases, the cabling provider will have to estimate the value of **A** based on the location of the switchboard in relation to the earth electrode.
3. If the equipotential bonding point is the earthing bar/terminal in the switchboard, **A** = 0, so **B** = 10 metres.
4. The CET (Communications Earth Terminal) may be located in any convenient position (including inside the MDF enclosure) but must **not** be located inside the electrical switchboard.

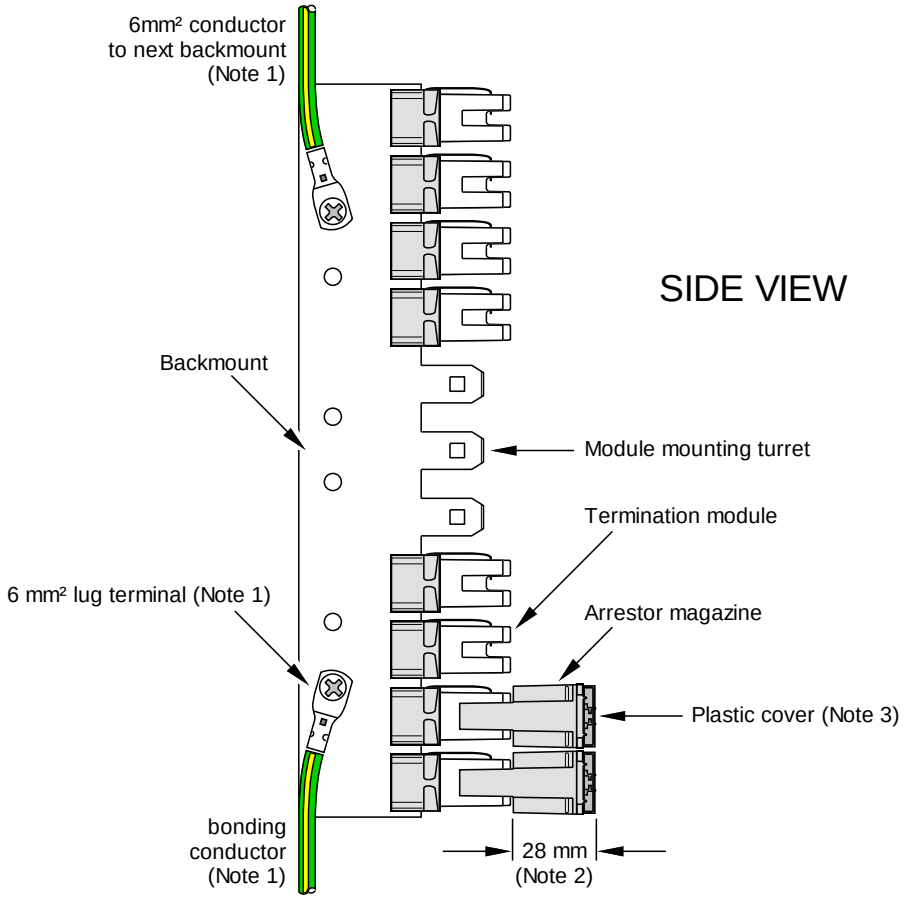
Figure 17 Bonding/Earthing of Profil style KRONE module backmounts



Notes:

1. Use KRONE Profil earth strap (TE Connectivity Product No. 6455 2 042-00) to earth the backmount rods. This strap is normally supplied with the KRONE 100-pair backmount frame but is also available separately.
2. Crimp a lug terminal to the bonding conductor and secure it to the earth strap with a suitable bolt using a star washer or lock washer between the nut and the strap. Where two or more backmounts are to be earthed, bond them together using a 6 mm² green/yellow conductor. Spade (forked) terminals must **not** be used for termination of earthing conductors.
3. Where the backmount rods are supported by a metal bracket, the metal bracket may have screw terminals for connection of earthing conductors. In this case, the Profil earth strap is not required — simply terminate the bonding/earthing conductor(s) on the metal support bracket.

Figure 18 Bonding/Earthing of turret style KRONE module backmounts



Notes:

1. Crimp a lug terminal to the bonding conductor and secure it to the backmount with a suitable bolt using a star washer or lock washer between the nut and the backmount. Where two or more backmounts are to be earthed, bond them together using a 6 mm² green/yellow conductor. Spade (forked) terminals must **not** be used for termination of earthing conductors. The bonding conductor and other earthing conductors may be fastened on the inside or outside of the backmount, whichever is convenient.
2. MDFs are required to have a minimum clearance of 30 mm between the front face of the lead-in termination modules and the inside face of the door or cover of the MDF. This is to allow room for fitting of arrestor magazines.
3. The KRONE arrestor magazine is supplied with a clear plastic cover, which must be fitted to the installed magazine to prevent accidental human contact with the uninsulated arrestors.

6.16 Surge suppression

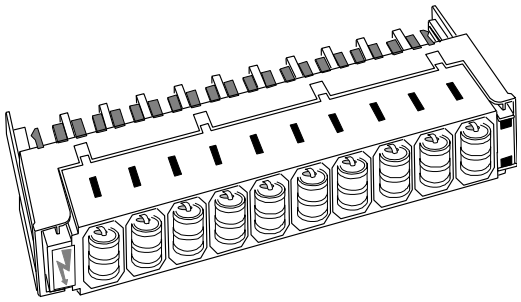
6.16.1 General

KRONE arrestor magazines are used to provide customer lightning protection (CLP) at customer MDFs and are plugged into the front of KRONE Series 2 Disconnection modules. In designated high lightning risk situations, the arrestor magazine will be fitted on the “A” side of the MDF by Telstra at Telstra’s cost. In other circumstances, the lightning surge suppression must be installed on the “B” side of the MDF by the cabling provider at the customer’s cost.

The standard Telstra KRONE arrestor magazine (TE Connectivity Product No. 6462 2 099-00) uses 500 V gas arrestors.

Note: 230 V KRONE arrestor magazines are available (TE Connectivity Product No. 6462 2 053-10) and may be used at a customer MDF. However, while these may provide slightly better surge protection for equipment, they do not significantly improve the level of end-user protection and the lower firing voltage increases the safety risk to the Telstra network under electrical power system fault conditions.

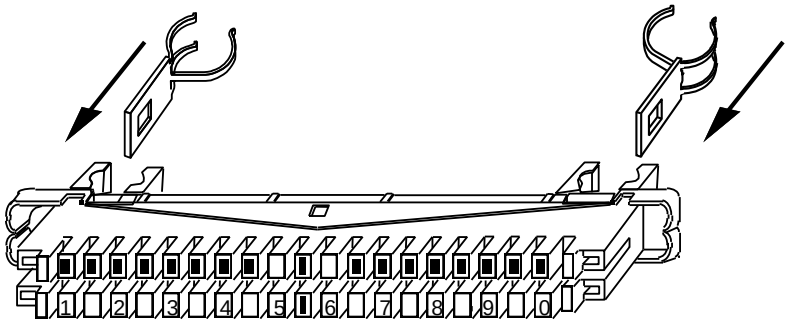
Figure 19 KRONE arrestor magazine



Notes:

1. The standard arrestor magazine used by Telstra contains 500 V protectors and may be used to provide lightning surge suppression at either the customer MDF or other distributors on the customer's side of the MDF. An arrestor magazine with 230 V protectors is also available but may only be used to provide surge suppression at a customer MDF.
2. The arrestor magazine is supplied with two Profil clips for insertion into the termination module to which the arrestor magazine is to be fitted and where a Profil backmount is used (see Figure 20). The kit also includes a clear plastic cover, which must be fitted to the installed magazine to prevent accidental human contact with the uninsulated protectors.

Figure 20 Fitting Profil earthing clips to a KRONE termination module



6.16.2 Backmount earthing

Ensure that the metallic backmount is connected to the bonding conductor as described in 6.15. There are three different types of KRONE module backmount or mounting to be considered:

- Profil type (i.e. mounting rods) — see Figure 17
- turret style (i.e. U-shaped sheet metal with mounting tongues) — see Figure 18
- 10-pair MDF (the modules are moulded into the plastic base, but only the "A" side module has a metal fitting that the arrestor magazine can connect to). The bonding conductor is connected to the earth terminal, which in turn is bonded behind the MDF base to the metal turret at the lower end of the "A" side module. See Figure 8 (page 18).

  Note: A similar distribution box to the KRONE 10-pair MDF is available but must **not** be used as an MDF or for installation of surge suppression because:
  - it does not have a metal turret for earthing of an arrestor magazine; and
  - the cover of this box is not deep enough to accommodate the arrestor magazine.

6.16.3 Running jumpers where an arrestor magazine is fitted

The arrestor magazine must be removed from the termination module to connect jumpers or test cords. Unplug the arrestor magazine by pulling it straight out with even force at **both** ends of the magazine.

Don't forget to plug the magazine back into the module after the jumpering or testing is done!

6.17 Obsolete solder-tag MDFs

6.17.1 General

Solder tag distribution boxes and frames were used to terminate lead-in cabling well into the 1980s and probably right up to “deregulation” of premises cabling in 1989. There are still many of these in service. Cabling providers will often need to connect cables and jumpers to solder tag boxes and frames.

Solder tags make reliable connections as long as the conductors are terminated and soldered correctly. A typical solder tag terminal block is illustrated in Figure 21. The fanning strips behind the terminals vary, depending on whether the terminal block is mounted on a timber batten/backboard (per Figure 22) or on metal framework (per Figure 23).

The correct method and two common, but incorrect, methods of terminating cables and jumpers on solder tag terminals are shown in Figure 24.

All connections on solder tag terminals **must** be soldered.

The connection should be soldered using a 30 watt to 45 watt soldering tool with a 6 mm (1/4”) to 8 mm (5/16”) bit. Apply a little solder to the tip of the soldering bit first, then press the tip of the iron flat against the underside of the end of the tag and apply resin cored solder (65% tin, 35% lead) to the “V” in the terminated conductor (see Figure 25).

Examples of good and bad soldering are shown in Figure 26. To achieve an “acceptable connection” shown in Figure 26, it is important that the terminal be clean in the first place and that not too much heat be applied — just enough for the solder to flow smoothly into the crevices.

Figure 21 A typical solder-tag terminal block (obsolete)

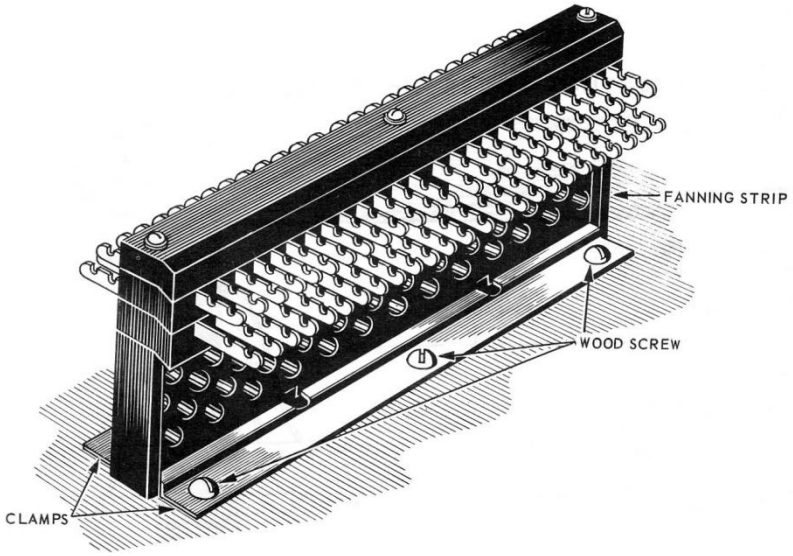
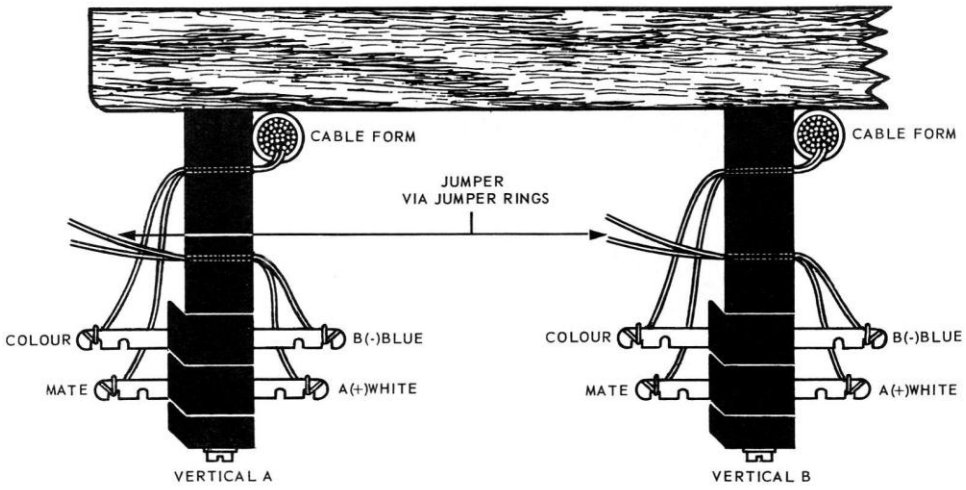
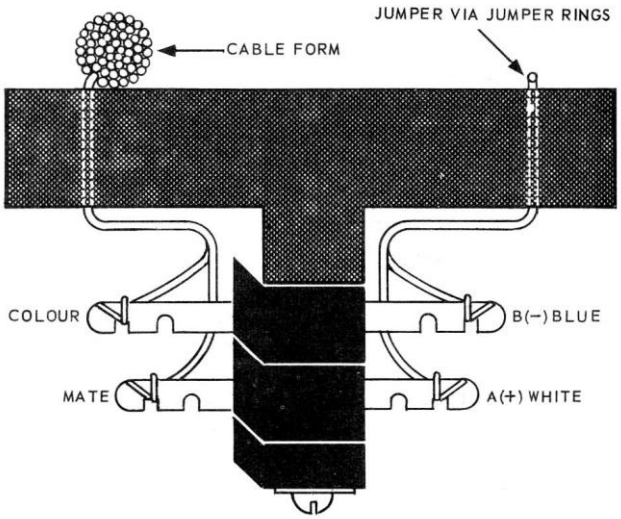


Figure 22 A type of solder-tag terminal block used in wall-mounted distribution frames



Note: If the distribution box only has two verticals without jumper rings, the cables are usually terminated on the inside terminals and the jumpers run directly between the outside terminals. Ensure that sufficient slack is left in the jumpers (25 mm to 50 mm with these boxes) to enable them to be traced.

Figure 23 A type of solder-tag terminal block used in bay-frame (wall-mounted) or floor-mounted distribution frames



Notes:

1. These terminal blocks are usually mounted on metal framework secured to the wall or floor.
2. Leave sufficient slack in the jumpers (50 mm to 100 mm with these frames) to enable them to be traced.

Figure 24 Terminating a conductor on the solder-tag terminal

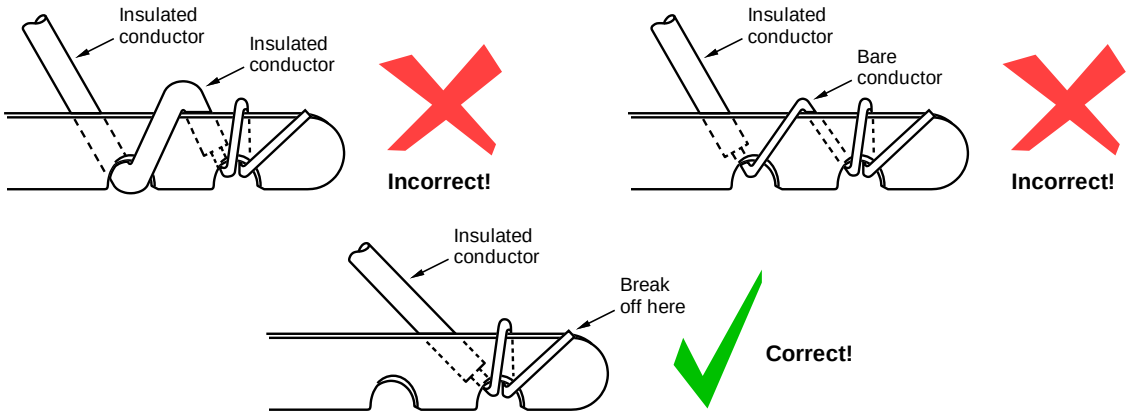
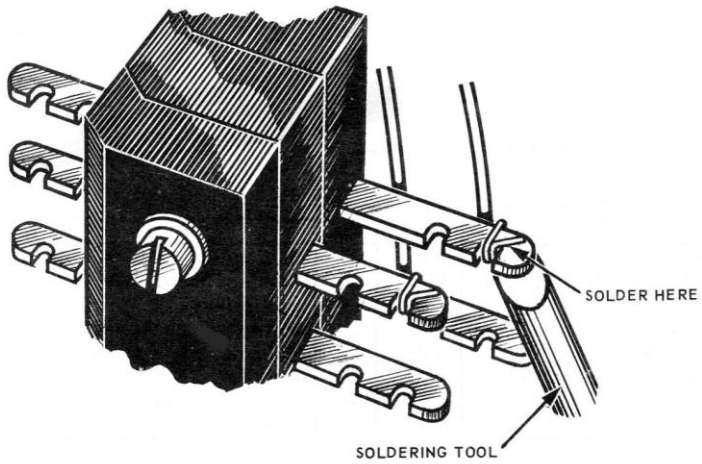


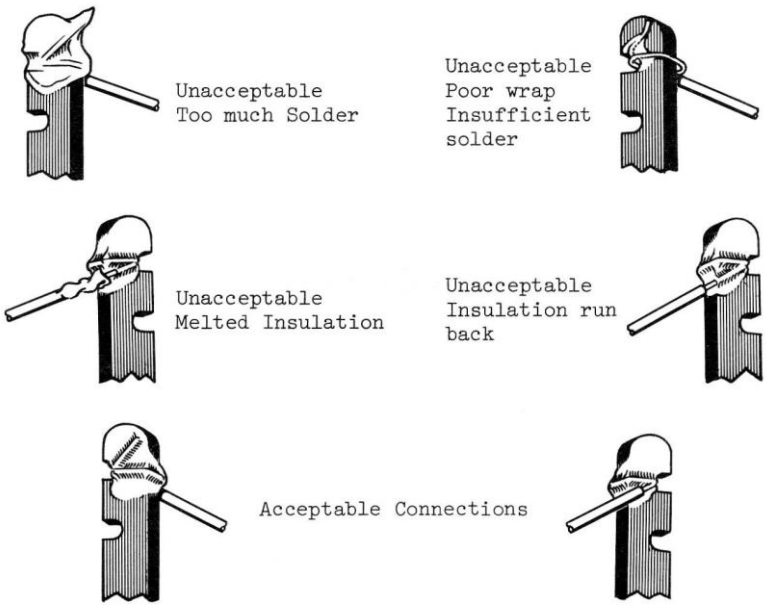
Figure 25 Soldering terminated conductors



Notes:

1. Use a 30 watt to 45 watt soldering tool with a 6 mm (1/4”) to 8 mm (5/16”) bit and resin cored solder composed of 65% tin and 35% lead.
2. Apply a little solder to the tip of the soldering bit first, then press the tip of the iron flat against the underside of the end of the tag as shown above.
3. Apply solder to the “V” in the terminated conductor.
4. See Figure 26 for examples of good and bad soldering.

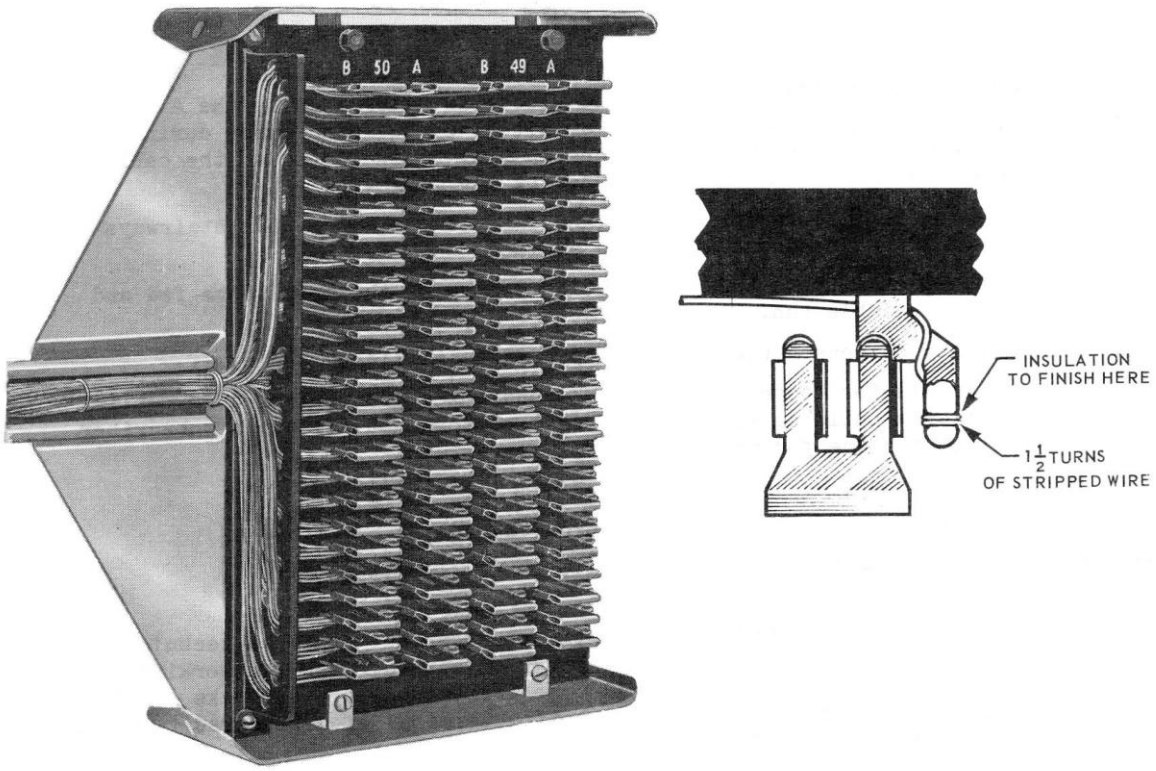
Figure 26 Good and bad soldering



6.17.2 Link mounting frames

The solder tags in link mounting frames are different to the terminal blocks described above and a different terminating method is used for the cable connections (see Figure 27). However, for jumpers, use the same terminating method prescribed for other types of solder tags (as shown in Figure 24).

Figure 27 Link mounting frame



Note: Cables are connected to the link mounting block as shown above. However, jumpers on the other side of the block must be terminated in accordance with Figure 24.

6.18 Other obsolete termination equipment

Small screw terminal boxes were used prior to “deregulation” in 1989 for connection of several services to small businesses or blocks of flats/units.

These are **not** MDFs, nor are they NTDs. They are lead-in cable jointing devices. The following information is included in this Document for completeness only.

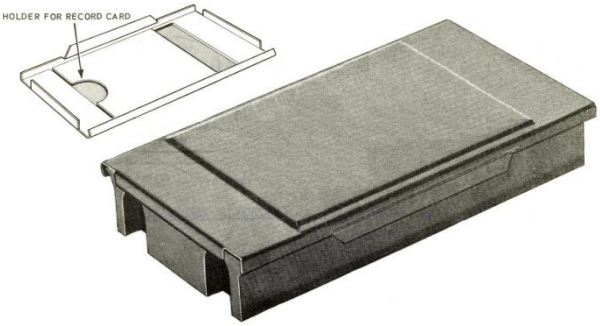
The 5-pair and 10-pair screw terminal blocks pictured in Figure 28 and Figure 29 were made of black Bakelite and had a slide-on or clip-on metal cover with a record card holder on the inside of the cover. These blocks were designed for indoor use only and may be encountered in some old residences and small businesses. The correct method of terminating conductors on these screw terminal blocks is illustrated in Figure 30.

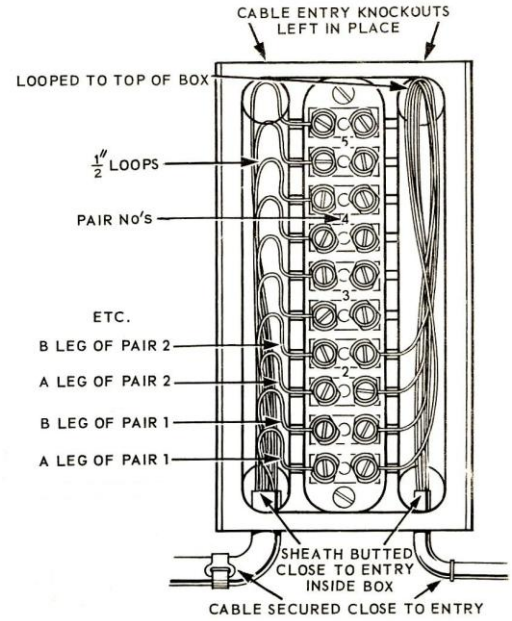
A later style of screw terminal box, made from ivory or grey plastic, is shown in Figure 31. It was designed to terminate conductors without the need to strip the conductor insulation. The end of the insulated conductor is inserted under one side of the screw and the screw tightened. The conductor should **not** be wrapped around the screw with this box or effective connection may not be made.

These screw terminal devices are **not** MDFs or NTDs and are **not** a defined network boundary point. However, a cabling provider is authorised to disconnect an existing indoor cable and reconnect a replacement cable to the device in accordance with Telstra Document No. 012882, *Alteration of Telstra facilities in homes & small businesses — Information for cabling providers*, which may be accessed from the Telstra Smart Community website (http://www.telstra.com.au/smart-community/builders/).

Where a faulty block/box needs to be replaced, the matter should be referred to Telstra. Telstra may choose to replace the faulty block/box with a suitable joint or, if the customer/s is/are agreeable **and** the position of the block/box meets the current requirements for the location of a customer MDF, replace it with a small MDF, in which case it will then unambiguously become a network boundary point.

Figure 28 5-pair screw terminal block (obsolete)

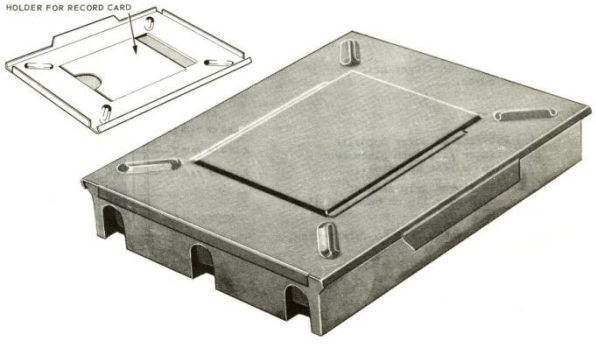


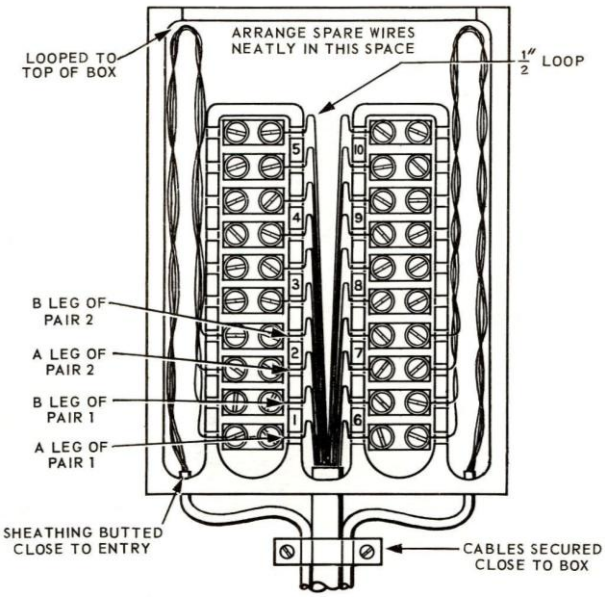


This block is **not** an MDF or NTD

Note: This block was used to connect a 5-pair cable to two or more smaller cables (e.g. to connect two or more services to a small business or to connect services to two or more shops, units or flats). Only one conductor should be terminated under each screw as shown in Figure 30.

Figure 29 10-pair screw terminal block (obsolete)

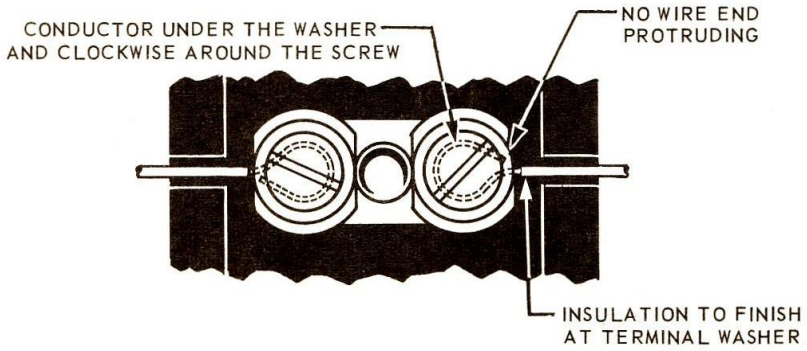




This block is **not** an MDF or NTD

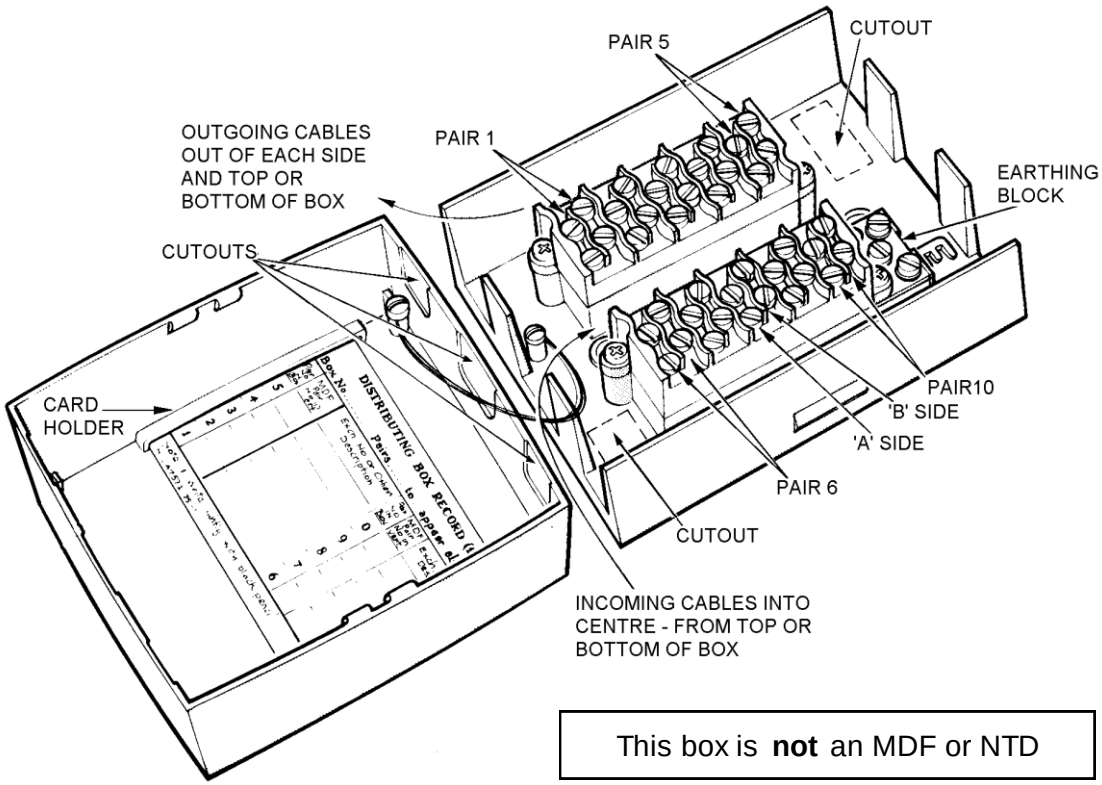
Note: This block was used to connect a 6-pair or 10-pair cable to two or more smaller cables (e.g. to connect two or more services to a small business or to connect services to two or more shops, units or flats). Only one conductor should be terminated under each screw as shown in Figure 30.

Figure 30 Terminating conductors on screw terminal blocks



Note: Only one conductor should be terminated under each screw. If more than one conductor needs to be terminated under the screw, twist the bare conductors together before wrapping them around the screw and **lightly** tighten the screw (over-tightening the screw may sever one or more of the twisted conductors).

Figure 31 Insulation-crushing screw terminal box (obsolete)



This box is **not** an MDF or NTD

Notes:

1. This box was used to interconnect several cables (e.g. to connect two or more services to a small business or to connect services to two or more shops, units or flats).
2. With this box, the insulated conductor must be inserted under one side of the screw and the screw tightened. Do **not** wrap the conductor around the screw or proper connection may not be made. Only one conductor should be connected to each screw.

6.19 Contacting Telstra

6.19.1 New MDF

Where it is necessary to contact Telstra for advice about the installation (e.g. location) of a **new** MDF or to get the Telstra lead-in cable terminated on the MDF, please call the appropriate number listed below and follow the procedure listed.

Home 13 2200

Business 13 2000

- To the automated voice greeting, respond "**connections**", then "**fixed line phone**", and then your **telephone number** or "**I don't have one**", as applicable.
- Inform the Telstra consultant that you need to get Telstra's lead-in cabling terminated on the customer MDF.
- State the address to which the enquiry is related and, when requested, your name and contact number. If you were previously given a job number when arranging lead-in pre-provisioning or an order number when requesting a new service, quote this number.
- If the Telstra consultant suggests that you may get any registered cabler to do the work, clarify that it is network cabling work that is outside the scope of work that registered cablers are permitted to do.
- For new buildings, the lead-in cabling is terminated on the MDF at Telstra's cost (this includes supply of the lead-in termination modules). If the work is required due to building or MDF alterations that are not associated with the connection of additional new Telstra services, charges will apply for the work, payable either to Telstra (if Telstra does the work) or directly to the Telstra contractor (if a Telstra contractor does the work).

6.19.2 MDF alterations

For relocation of an **existing** MDF or associated lead-in cabling (e.g. due to building renovations or land redevelopment), please call the number listed below and select the appropriate option.

Home or Business 1800 810 443

- Whether or not you believe any digging will be necessary, first contact the Dial Before You Dig (DBYD) "free call service", by telephoning 1100 or by visiting the DBYD website at www.1100.com.au for information about any underground services that may be in the vicinity.
- Once you have received the plans, call the above 1800 number.
- You will receive a brief automated voice greeting and then you will be switched through to the Telstra Network Integrity Team with which you may discuss your requirements.
- The labour rate and other charges that apply for the alterations required are set out in Telstra's "Our Customer Terms" available online at http://www.telstra.com.au/customer-terms/.

7 DEFINITIONS

Term	Definition
A2A	“Authorisation to Alter” (Telstra Document No. 012882)
ACMA	Australian Communications and Media Authority (formerly AUSTEL, then ACA) — the telecommunications industry regulator responsible for technical regulation (e.g. governance of compliance labelling, cabling provider registration, mandatory technical standards for customer equipment, and wiring rules)
ACMA-compliant	Complies with technical standards made by the ACMA, specifically Australian Standard AS/CA S008, *Requirements for customer cabling products*, and its predecessors
AS	Australian Standard
AS/CA (Australian Standard/ Communications Alliance)	An Australian standard developed and produced by Communications Alliance (formerly ACIF)
AS/NZS (Australian/New Zealand Standard)	A joint Australian/New Zealand Standard prepared by representatives from each country and which includes requirements common to each country
bonding	See “equipotential bonding”
builder	A person charged with the construction or renovation of any building
building	A substantial construction intended to protect persons, animals, vehicles, machinery, tools or equipment from the weather
building entry point	The point on a building where telecommunications cabling enters the building
CA	Communications Alliance
cabler	See “cabling provider”
cabling	Cable or cables and any associated works or parts such as pits, poles, conduits, trays, connecting devices, jumpers, etc.
cabling provider	A person registered as a cabling provider under the *Cabling Provider Rules*
Cabling Provider Rules	The *Telecommunications Cabling Provider Rules 2000*
coaxial cable	A dual conductor cable in which a centre conductor is surrounded by, but does not contact, a concentric, cylindrical outer conductor
conduit	A tube or pipe that physically accommodates cables
cross-connection	A method of providing for flexible interconnection of cables or cable elements (e.g. pairs) by means of jumpers or patch cords

Term	Definition
customer	A person who subscribes to (pays for) the supply of a telecommunications network service or an end-user of that service
customer cabling	Any cabling connected on the customer's side of the network boundary
customer equipment	Any equipment connected on the customer's side of the network boundary
distributor	A collection of components used to terminate cables and which provides facilities for cross-connection by means of jumpers or patch cords
earth	An electrical connection to the mass of earth. This can be made by driving or burying a metal electrode in the ground but, within customer premises, is usually – and should be – made via a connection to the earthing bar or terminal of the electrical switchboard or to the earth electrode of the electrical earthing system. Earth may also be described as "ground".
earthing	The act of connecting equipment or cabling to an earth reference such as to the electrical earthing system of the electrical installation or an earth electrode. Earthing may also be described as "grounding".
equipotential bonding	Bonding (connecting) two or more earthing systems or earthed parts together to ensure that they are at approximately "equal potential"
FDP	Final Distribution Point — a cable distribution device used as the last distribution point in a distributed cabling system
fibre/fiber	See "optical fibre"
first socket	That socket within a building that terminates Telstra's lead-in cable. There may be more than one first socket within a building (e.g. multiple lines). The first socket is a defined network boundary point.
first TO	The telecommunications outlet (TO) that contains the first socket
home networking	Cabling within a home that is capable of being used to link ("network") several personal computers — see "structured cabling"
HV	High Voltage — a voltage exceeding 1000 V AC or 1500 V DC
indoor	Installed inside a building
ISO/IEC	International Standardisation Organisation/International Electrotechnical Commission — used to prefix a standard or other document developed jointly by both organisations
jumper	A cable unit or cable element without connectors (e.g. a pair of wires) used to make a cross-connection within a distributor
KRONE	KRONE Australia (manufactured by TE Connectivity) — the brand of Telstra's standard lead-in termination modules for customer MDFs

Term	Definition
lead-in cabling	A carrier's (e.g. Telstra's) cabling from the last distribution point (typically in the street) and the network boundary in the customer's premises
LV	Low Voltage — a voltage exceeding 42.4 V peak (about 30 V AC r.m.s. for a sine wave) or 60 V DC but not exceeding 1000 V AC or 1500 V DC
m	metre or metres
Main Distribution Frame	See "MDF"
max.	maximum
MDF	Main Distribution Frame — a distributor that provides an electrical termination point for a carrier's (e.g. Telstra's) lead-in cabling. An MDF is a defined network boundary point.
min.	minimum
mm	millimetre/s — one millimetre is one thousandth of a metre
network boundary (point)	The point that is deemed by legislation to be the boundary of a carrier's telecommunications network. This is usually an MDF, an NTD or a socket.
NTD	Network Termination Device — a device provided by a carrier to establish a demarcation point between the carrier's telecommunications network and customer cabling or customer equipment. The NTD will be permanently marked at manufacture with the words "Network Termination Device" or the letters "NTD". An NTD is a defined network boundary point.
NTD	See "Network Termination Device"
optical fibre	A fine, flexible, transparent fibre made of pure glass (silica) designed to convey light between two points. The American spelling, "fiber", is often encountered but there is no actual difference between "fibre" and "fiber".
outdoor	Installed outside a building, including on the external surface of a building or other structure
patch cord	A flexible cord terminated with plugs to make a cross-connection between sockets within a patch panel or between a socket and equipment
patch panel	An array of sockets that may be cross-connected by means of patch cords
premises	An area of land that contains one or more buildings. In this Document, "premises" refers to the land and any building or structure located on that land. The description "building" is used in reference to any building within the premises.
registered cabler / cabling provider	A person who is registered in accordance with regulatory requirements to install or repair customer cabling

Term	Definition
rural	An area in which the properties have frontages greater than an average of 60 m, lot sizes generally larger than 1000 m², and there is usually no curb and channel and no street lighting. The telecommunications network construction is usually characterised by long cable routes with direct-buried cables.
service provider	A supplier of carriage services (e.g. an internet or pay TV connection using a carrier's network) or content services (e.g. pay TV programs or an internet website)
socket	Often also described as a "jack", a socket is a connecting device designed to accept a mating plug
structured cabling	A term used to describe a cabling system having a structure that enables it to be used for various purposes including a local area network (LAN) and telephony — also called "generic cabling"
surge suppression	A device or technique used to limit the rise in voltage between two or more parts of a cabling system or within equipment, which may be caused by a lightning discharge or a surge in the power supply system
telecommunications network	A system, or series of systems, that is operated by a carrier or carriage service provider for carrying communications to, from or between customers by means of guided and/or unguided electromagnetic energy
telecommunications outlet (TO)	A fixed connecting device to which an end-user may connect customer equipment to telecommunications cabling. A telecommunications outlet includes the socket(s) and associated mounting hardware (e.g. wall plate)
Telstra	Telstra, its employees or contractors
TO (or TOs)	See "telecommunications outlet"
trunking	A tray or trough system with removable covers along its length that is used for housing and protecting cables — sometimes referred to as "ducting"
urban	An area in which the properties have frontages less than an average of 60 m, lot sizes generally smaller than 1000 m², and the roads usually have curb and channel and street lighting. The telecommunications network cables are usually installed in conduit.
V	Volt/s
V AC or V a.c.	Volt/s alternating current
V DC or V d.c.	Volt/s direct current
wiring rules	For telecommunications cabling, this means Australian Standard AS/CA S009 or its replacement. For electrical cabling, this means Australian/New Zealand Standard AS/NZS 3000.

8 REFERENCES

Document number	Title
012688	Telstra Network Termination Device (NTD) — Information for cabling providers
012882	Alteration of Telstra facilities in homes & small businesses — Information for cabling providers
AS/CA S008	Requirements for customer cabling products
AS/CA S009	Installation requirements for customer cabling (Wiring rules)
AS 3835.1	Earth potential rise — Protection of telecommunications network users, personnel and plant — Code of practice
AS 60529	Degrees of protection provided by enclosures (IP Code)
AS/NZS ISO/IEC 15018	Information technology — Generic cabling for homes
HB 252	Communications Cabling Manual Module 3: Residential communications cabling handbook
CA C559 Part 1	Industry Code: Unconditioned Local Loop Service (ULLS) Network Deployment Part 1 — ULLS Performance Requirements

9 DOCUMENT CONTROL SHEET

Issue number	Issue date	Details on the change
1	22 June 2009	
2	26/08/2013	General update