

Victorian Electricity Distributors

Service & Installation Rules 2005

CITIPOWEI





These Service & Installation Rules form the following Distributors "Reasonable Technical Requirements" for the connection of electrical installations to their Victorian electricity networks:

- AGL Electricity Ltd
- CitiPower Pty
- Powercor Australia Ltd
- TXU
- United Energy Distribution



Foreword

The Service & Installation Rules (SIR) 2005, have been consolidated by the Victorian Electricity Distributors SIR Management Committee and supersede the 1999 edition and subsequent July 2001 and September 2003 amendments.

The Rules are applicable from 1 September 2005 and apply to all connections to the electricity supply networks operated by Electricity Distributors AGL Electricity, CitiPower, Powercor Australia Ltd, TXU and United Energy Distribution within Victoria.

They form the major part of these Distributors "reasonable technical requirements" referred to in the Electricity Distribution Code. The Electricity Distribution Code is applied under the Electricity Industry Act and is administered by the Essential Services Commission Victoria.

The revised Rules have been subject to extensive industry consultation during their development.

A purpose of the Rules is to provide its users with industry agreed specifications to assist distributors, retailers, customers and customers' agents to comply with their regulatory and electricity supply obligations, and to limit the need to reference the complex, extensive and expanding range of regulations and documentation relating to connection of installations to Victorian electricity networks.

AGL Electricity, CitiPower, Powercor Australia, TXU and United Energy Distribution require all installations connected or to be connected to their electricity networks within Victoria to comply with these Rules as a condition for providing and maintaining electricity supply.

However, there may be situations the Rules do not cover. These may include unusual connections, situations that have been inadvertently omitted, and alterations to legislation and codes. The management committee does not accept responsibility where these situations occur.

The relevant electricity distributor must be consulted where these situations are encountered.

Ken Greenway CHAIRMAN VICTORIAN SERVICE & INSTALLATION RULES MANAGEMENT COMMITTEE

Section 1

General

Victorian Service & Installation Rules - 2005

 $\ensuremath{\mathbb C}$ AGL Electricity, Citipower Ltd, Powercor Australia Ltd, TXU and United Energy Distribution

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1.2 References

This list of references has been made as comprehensive as possible at the time of publication. However, other references may have been applicable at the time but inadvertently omitted, and the references listed may have been amended or made obsolete and new references may be applicable. The user is responsible to ensure correct references are applied.

Acts include:

- Office of the Regulator-General Act 1994
- Electricity Industry Act 2000
- Electricity Safety Act 1998
- Essential Services Commission Act 2001
- National Electricity (Victoria) Act 1997
- Occupational Health & Safety Act 1985
- Trade Practices Act 1974 (Cth)

Orders and licences provided by the regulators under the Acts include:

- Orders in Council made under the Acts
- Licences issued to Distributors and Retailers by the ESC under the Electricity Industry Act

Statements, Codes and Guidelines published by Regulators under the Acts include:

- National Electricity Code
- Electricity Distribution Code
- Electricity System Code
- Electricity Retail Code
 - Electricity Customer Metering Code
- Public Lighting Code
- VESI Metrology Procedure
- Guidelines published by the ESC

• Electricity Safety (Network Assets) Regulations 1999 Guidelines

Regulations include:

(Network Assets) Regulations 1999 (Installations) Regulations 1999

(Bushfire Mitigation) Regulations 2003

(Stray Current Corrosion) Regulations 1999

- Framework for Undertaking Work Near Overhead and Underground Assets (No Go Zone)
- Code of Practice:

Code of Practice:

In-span Crossings

Supply Industry (Blue Book)

Shared Use of Poles Code

Electricity Safety:

- for Electric Line Clearance (1999)
- for Safe Electrical Work Low Voltage Electrical Installations

for Overhead Power and Telecommunications

on Electrical Safety in the Victorian Electricity

for Low Voltage Fuse Removal and Reinsertion

- Prevention of Falls:
 - in Housing Construction
 - in General Construction

Other references include:

- Distribution Company's List Of Approved Charges
- Specification for Indoor Substation on Customers Property
- Guide to the Permanent Earthing of Distribution System Assets
- Australian/New Zealand Standards

References Administrators and their Contact Details include:

- Australian Standards Electricity Retailers Essential Services Commission National Electricity Code Administrator National Electricity Marketing Management Company Office of the Chief Electrical Inspector Victorian Electricity Distributors Victorian Workcover Authority
- www.standards.com.au www.esc.vic.gov.au – Licences Issued www.esc.vic.gov.au www.neca.com.au www.nemmco.com.au www.ocei.vic.gov.au – See Section 3 of these Rules. www.workcover.vic.gov.au

1.3 Definitions

The definitions contained herein apply to these Service & Installation Rules and may vary from definitions contained in other documents.

Authorised Person – the person in charge of the premises, or the registered electrical contractor or licensed electrical installation worker or other person appointed or selected by the person in charge of the premises, to perform certain duties associated with the electrical installation on the premises.

Common Property - is all that part of a subdivided site that is not within the lots or reserves on the plan of subdivision. The common property is owned by the registered proprietors of the lots on the plan of subdivision as noted as tenants in common in shares proportional to their "lot entitlement".

Consumer Mains – Those conductors between the point of supply/consumer terminals and the main switchboard.

Consumer's Terminals – the junction at which the consumer mains connects to the Distributor's service cable or supply main conductors. Refer to Clause 6.3 (Consumer Terminals).

Customer – means the person or body which requires electricity to be made available to an electrical installation on a property, and includes the owner, occupier or tenant as the case may require or a group of bodies acting as one in the provision of electricity to their property.

Refer to clause 2.15.2 for Electricity Metering Code Definition of Customer.

Customer Agent/s – Customer agents are parties representing the customers. Such parties may include registered electrical contractors, licensed electrical workers, licenced electrical inspectors, consulting engineers, architects, and equipment manufacturers.

Determined Maximum Demand – means the demand imposed on the Distributor's supply system as assessed by the Responsible Officer.

Distributor – means a person who holds a Distribution Licence, or who is exempted from holding a licence of the Electricity Industry Act.

- A "Distributor" is also known as the Local Network Service Provider (LNSP).
- A "relevant Distributor" is the Distributor who operates the Network in the area associated with an electrical installation.

Distribution Licence – means a licence to distribute and supply electricity granted under the Electricity Industry Act .

Electricity Distribution Code– means the Electricity Distribution Code administered by the Essential Services Commission.

Electrical Installation – The consumer terminals, their enclosure, and all wiring and equipment downstream and supplied from those terminals, except for the Distributor's network assets and where applicable, the metering assets.

An electrical installation does not include Distributors network assets including:

- Meter equipment within an electrical installation, the service and distribution equipment upstream of the consumer terminals.
- Network assets on land occupied by a Distributor that is not used for the consumption of electricity on that land or incidental to that consumption.
- Fuse cartridges for a Service Protection Device and/or Supply Disconnection Device

LEIW – means Licensed Electrical Installation Worker.

Meter Provider – The person who installs and maintains the metering – Refer to clause 2.15 for Electricity Metering Code Definition of Meter Provider.

Must– is to be understood as mandatory.

Occupancy – means an electrical installation or part thereof, which is supplied with electricity through a specific meter or meters and for which an individual electricity consumption account is rendered.

Occupancies Multiple or Multiple Occupancies – means more than one Occupancy connected to the same electrical installation.

Point of Attachment - The point at which an overhead aerial service cable is attached.

Point of Supply – the point at which the electricity Distributors service cable or supply main connects to the consumer terminals. Refer to clause 6.2 (Point of Supplies). (The Electricity Safety Act 1998 regulates Points of Supply locations)

Private Electric Line – any electric line that conducts electricity within an electrical installation from the Point of Supply.

Private Overhead Electric Line (POEL) – all components of any private electric line that is constructed as an aerial wiring system.

Property – "Property" is defined in clause 6.2 (Point of Supplies).

Public Land – "Public Land" is defined in clause 7.8.4 (Private Electric Lines in Public Land)

REC – means Registered Electrical Contractor.

Responsible Officer – means the officer appointed by the relevant Distributor to be responsible for the administration of these Rules.

Dependent on a Distributor's structure, there may be multiple Responsible Officers with specific responsibilities, eg, negotiation for supply, provision of substations, specification of points of supply, types of supply, servicing and metering etc.

Retailer – means a holder of a Retail Licence, or a person who has been exempted from the requirement to obtain a Retail Licence under the Electricity Industry Act.

Retail Licence – means a licence to sell electricity otherwise than through the Pool granted under the Electricity Industry Act .

Service Cable / **Line** – the final span or section of a Distributor's low voltage aerial or underground network asset that is connected to the consumer terminals.

Service Equipment – means equipment owned by the Distributor and used to connect supply to an Electrical Installation

Service Protection Device – A device required by the Electricity Safety Act and clause 7.4 (Service Protection) of these Rules.

Shall – is to be understood as mandatory.

Should – is to be understood as non-mandatory, i.e. advisory or recommended.

Subdivision – means the division of land into two or more parts which can be disposed of separately.

Suitable (or suitably) – means to the satisfaction of the Distributor's Responsible Officer.

Supply Connection Facility – A facility containing consumer terminals, eg, pillar, cubicle, switchboard or CT enclosure.

Supply Disconnection Device - A supply disconnection and reconnection device as required by clause 7.5 (Supply Disconnection Devices).

Underground Reticulated Distribution (URD) – is defined as an underground cable network used in areas where no electrical protective device is provided at the origin of the individual service cable.

Un-metered Supply – A supply that is not metered

Wiring Rules – means the Wiring Rules published by Standards Australia as applied under the Electricity Safety Act and Regulations.

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Section 2

Introduction

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2.1 Disclaimer

These Rules have been published by AGL Electricity, CitiPower, Powercor Australia, TXU and United Energy Distribution. The document has been compiled using drawings, guidelines and information that comply with the relevant acts and regulations of the State of Victoria at the date of publication. It is the responsibility of the end user to determine the suitability of material contained herein to the particular application or purpose of which it is used. Electricity supply publications are revised when necessary by the issue of either revised pages or complete new editions. It is important that users of such publications ascertain they are in possession of the latest issue.

AGL Electricity, CitiPower, Powercor Australia, TXU and United Energy Distribution each expressly disclaim any liability, joint or several, to anyone including, without limitation, any end-user of this document, in respect of anything done by them in reliance in whole or in part upon the contents of this document.

2.2 Copyright

COPYRIGHT © 2005 AGL Electricity, CitiPower, Powercor Australia, TXU and United Energy Distribution.

All rights are reserved, although the above Distributors will not object to the reproduction or copying of this document or sections of the document for the purpose of education or enhancing the Rules application.

However, no part of this document may be reproduced or copied for financial gain in any form without first obtaining the express written permission of the Service and Installation Rules Management Committee on behalf of AGL Electricity, CitiPower, Powercor Australia, TXU and United Energy Distribution.

Inquiries concerning copyright should be directed to the Rules Management Committee.

2.3 Innovation

These Rules do not preclude other methods, innovation, or technology that achieves the same outcomes as the specifications detailed in this document. Any such proposal should be put to the relevant Distributor or the Rules Management Committee for acceptance prior to commencement of work.

2.4 Objective

The objective of these Rules is to provide Victorian electricity customers with industry agreed Distributor reasonable technical requirements (Rules) that meet all legislative and code requirements for the supply and metering related aspects of any connection to the Victorian electricity supply networks.

This is intended to result in significant economies of scale and industry efficiencies due to relatively consistent application of common electricity supply Rules across Victoria.

2.5 Users

The main users of this document are distributors and retailers, their customers, the customer's agents, and associated industry parties and personnel.

These include registered electrical contractors, licensed electrical workers, licensed electrical inspectors, consulting engineers, architects, electricity distributor's personnel, electricity retailer's personnel, meter providers, equipment manufacturers, representative

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organisations such as unions, associations, training providers and students, the industry ombudsman, and other persons associated with the connection of customer electrical installations to electricity supply networks.

2.6 Publication and Revision

2.6.1 Administration

The revision, development and publication of these Rules is administered by the Victorian Service and Installation Rules Management Committee. The committee comprises of representatives from AGL Electricity, CitiPower, Powercor Australia, TXU and United Energy Distribution.

Committee advisers at the time of publication include representatives from the Office of the Chief Electrical Inspector and the National Electrical and Communications Association.

2.6.2 Publication

The Victorian Service and Installation Rules were first published in 1987 by the SECV and Local Government Electricity Suppliers. Amended rules were published in 1988, 1991 and 1994. Additional amendments were made in 1996, 1999, 2001 and 2003 by the SECV and Local Government Electricity Suppliers distribution network successors. This edition is applicable from 1 September 2005.

The document is currently available in hardcopy or compact disk format from Information Victoria, most electrical wholesalers, electrical contracting organisations and electrical inspection companies. It may also be referenced and downloaded from the website detailed in clause 2.7 (SIR Management Committee Contact) and most Distributor websites that are detailed in Section 3 (Distributor Areas and Contact Details).

2.6.3 Revision

Although changes to regulations are usually the catalyst for revisions, users and interested parties are invited to provide comment and suggestions to assist further development of the Rules at any time. Correspondence for this purpose should be forwarded to the Service & Installation Rules Management Committee in accordance with clause 2.7 (SIR Management Committee Contact).



Figure 2.1 Revision Process

2.7 SIR Management Committee Contact

Contact for any matter related to these Rules may be made though correspondence to the SIR Management Committee's web site www.victoriansir.org.au

Alternatively, contact may be made through the relevant Distributor.

2.8 Dispute Resolution

Where a customer has a complaint involving these Rules they should firstly contact the relevant Distributor's Responsible Officer and register their concern.

If not resolved, the complaint may be referred to a higher level person than the Responsible Officer within the Distributor's management structure. Where this does not result in a resolution, the complaint will be resolved in accordance with the Distributor's complaints and dispute resolution procedure as detailed within the individual company's charter.

2.9 Scope

These Service and Installation Rules form the major part of AGL Electricity, CitiPower, Powercor Australia, TXU and United Energy Distribution "reasonable technical requirements" referred to in the Electricity Distribution Code.

The Rules apply in respect to all electrical installations that are connected or that are to be connected to AGL Electricity, CitiPower, Powercor Australia, TXU and United Energy Distribution Victorian electricity supply networks.

However, there may be situations the Rules do not cover. These may include unusual connections, situations that have been inadvertently omitted, and alterations to legislation and codes. The relevant Distributor must be consulted where these situations are encountered.

These Rules do not apply to customers of embedded networks. A proposed embedded network operator must contact the relevant Distributor for connection of an embedded network. Customers connected to an embedded network must liaise with their embedded network operator for their conditions for connection of supply.

2.10 Application & Application Responsibilities

These Rules are applicable from 1 September 2005.

Transitional arrangements or exemptions may be able to be made with the relevant Distributor where it is deemed necessary to do so.

The relevant Distributor is responsible to administer all supply and metering related rules for connections to their electricity network.

Meter Providers are responsible for compliance with the metering requirements contained within these Rules.

Each Customer has an initial and ongoing responsibility to ensure their electrical installation complies with these Rules and any other conditions for supply. This is normally accomplished through their agents, eg, their Registered Electrical Contractor..

2.11 Failure to Comply with These Rules

Should the installation not satisfy these Rules, connection of electricity supply may be delayed, and installations on supply may be disconnected until such time as the non-compliance/s have been rectified

Re-inspection due to a failure to comply with these Rules may be undertaken by the Distributor and an Approved Charge for this service may apply.

Refer to the relevant Distributor for current fees.

2.12 Exceptional Circumstances

In exceptional circumstances the stated requirements contained in these Rules may be waived or modified by submission of a written request.

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The written request shall be accompanied by:

- i) a detailed statement of the reasons why non-compliance with these Rules is sought: and
- ii) a Statement of Consent' from the owner or controlling body of the installation.

No action should be taken until a written reply to such a request has been received.

Any request in this regard shall be addressed to the Nominated Officer of the relevant Distributor responsible for supply to the particular installation as follows:

AGL Electricity	Installations Inspection Co-ordinator AGL Electricity Ltd 30-40 King William Street Broadmeadows 3047
CitiPower	Connection Services Manager
	CitiPower
	Locked Bag 14031
	Melbourne 8001
Powercor Australia	Manager Connection Standards
	Locked Bag 14090
	Melbourne 8001
TXU	Network Safety Scheme Officer
	TXU
	Locked Bag 14060
	Melbourne 8001
United Energy Distribution C/O	Alinta Network Services
<u>.</u>	Field Practices & Compliance Officer
	Locked Bag 4001
	Moorabbin
	Victoria 3189

2.13 Offences

The Electricity Safety Act and Electricity Industry Act and regulations, codes and guidelines enabled under those Acts include regulation for protection of Distributor assets and qualification of persons who may work on those assets. Offences under these regulations include:

- Any work on a Distributor's network assets unless authorised by the relevant Distributor
- Unauthorised interference with any Network Asset:
 - Fuse link removal or insertion
 - Make or break of a connection, seal or lock
 - Dismantle or detach any Distributor's cables or equipment
 - Interference with electricity meters, time switches, equipment and/or service cables
 - Obtaining electricity by fraud
- Unauthorised access
 - to a Distributor's sub-station
 - to any Distributor's assets

If a person is found guilty of an offence, it could result in the imposition of substantial fines together with an order for damages to compensate the Distributor for any loss and court costs. It may also cause that person to have a criminal record.

2.14 Necessity for Employing a Licensed Person

In Victoria, regulations only permit suitably licensed and/or qualified persons to work on electrical installations. In addition, conditions apply to the actual undertaking, or contracting to perform such work.

Inquiries regarding licensing, the qualifications to work, to undertake work, and/or to contract to perform electrical work on electrical installations should be referred to the Manager, Electrical Licensing, Office of the Chief Electrical Inspector, Level 3, Building 2, 4 Riverside Quay, Southbank, 3006. Telephone 03 92039700. Facsimile (03) 9686 2197.

2.15 Basic Industry Relationship

2.15.1 Scope

This section is intended to provide an understanding of the basic relationships of industry stakeholders, (regulators and distributors, retailers, meter providers, customers and their agents), in respect to connection of installations to Victorian electricity networks.



Regulators



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2.15.2 Electricity Customer Metering Code Definitions

At the time of publication the Electricity Customer Metering Code contained the following definitions:

Customer – Means a *first tier customer*, a *second tier customer* or a person connected to an *embedded network*.

First Tier Customer – Means a person who buys electricity from its *local retailer* or from an unlicensed *retailer*. To avoid doubt, a *first tier customer* includes a former franchise customer with annual consumption of less than 40MWh per annum until such customer exercises its right to choose a new *retailer* after 1 January 2002.

Second Tier Customers - A *customer* who purchases electricity in its entirety from a person other than its *local retailer*.

Responsible Person - Means in relation to *second tier customers*, the person who has the responsibility for a *metering installation* for a particular *connection point*, being either the *distributor* or the "market participant" as described in chapter 7 of the *NEC*.

Meter Provider - Means a person who is engaged by the *responsible person* where the *responsible person* is not the relevant *metering provider* who is registered by, and accredited with, *NEMMCO* as a *metering provider*.

2.15.3 Responsibilities

2.15.3.1 Distributors

- Negotiate provision of supply directly with customers
- Transport and deliver electricity purchased by retailers and sold to customers.
- Connect customer installations to distributor supply mains, administer technical supply aspects of the connection.
- Are the Meter Provider for first tier customers, and second tier customers where requested or agreed for second tier customers.
- A distributor cannot energise a customer's installation unless the customer has selected a retailer, and the retailer has requested the distributor to connect the customer.
- Are responsible for matters such as electricity supply quality and reliability.

2.15.3.2 Retailers

- Purchase electricity and retail the electricity (transported by distributors) to customers.
- Nominate tariffs and arrange customers contract for the purchase of electricity
- Provides the Distributor with details of the Meter Provider where the Distributor is not responsible for the metering.
- Request distributors to connect or disconnect the customer installations to the distributor's network in accordance with the customer's contract with the retailer.

2.15.3.3 Customer Agents

Customer agents are parties representing the customers. Such parties may include registered electrical contractors, licensed electrical workers, licenced electrical inspectors, consulting engineers, architects, and equipment manufacturers.

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Section 3

Distributor Areas and Contact Details

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UNITED ENERGY Distribution

United Energy Distribution

C/O Alinta Network Services United Energy Distribution Pty Ltd (UED) is the company licenced by the Victorian Government to distribute electricity in the South Eastern suburbs of Melbourne, and the Mornington Peninsula. Alinta Network Services has been contracted by UED to manage the electricity network, and is therefore responsible for the operation and maintenance of the electricity lines in this area.

Faults:132 099New Connections:1300 131 689New Connections fax:1300 131 684Website www.ue.com.auRefer to road directories forBoundary details.Boundary details.



United Energy Distributoin

Section 4

General Rules

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4.1 Safety

All persons and contractors are responsible for all aspects of safety related to work performed by the said persons or contractors, their employees and agents.

The work should be performed in accordance with all relevant regulations, codes of practice, standards and the Rules within this document that are related to the safety of the work being performed.

4.2 Compliance with Regulations, Codes of Practices and these Rules

Every new electrical installation, alteration, addition, maintenance or repair to an electrical installation to be connected or reconnected to the Distributor's mains is required to comply with the current edition of the Electricity Industry Act, Electricity Safety Act and the Regulations and Codes of Practices under jurisdiction of those Acts, including compliance with these Rules, and other relevant Acts, Regulations, Codes of Practice and Guidelines.

The Distributor may inspect the electrical installation or occupancy to determine compliance with these Service & Installation Rules.

4.3 Testing

The Electricity Safety Act and Regulations require all electrical installation work to be tested in accordance with that Act and Regulations. Underground consumer mains shall also be tested to ensure compliance with SIR Clause 7.7.6.2 (Minimum Insulation Resistance).

4.4 Equipment Acceptance

Equipment used to interface with Distributor assets in accordance with these Rules must comply with the Electricity Safety Act and Regulations and be of a standard acceptable to the relevant Distributor.

4.4.1 Equipment Required to be Accepted

The relevant Distributor may refuse to connect equipment required to be accepted that has not been accepted, and/or is not suitably identified in accordance with these Rules.

Service raiser brackets, and direct metering enclosures and surrounds that are intended to be stocked and marketed by Electrical Wholesalers and similar distributors are required to be accepted for use by the SIR Management Committee prior to being connected to supply.

Service raiser brackets specifications may be referenced in Clause 7.3.5.3 (Specification, Acceptance and Installation) and direct metering enclosures and surrounds in Clause 8.4.3 (Meter Surrounds and Enclosures).

All inquiries and submissions relating to acceptance of equipment should be forwarded to the SIR Management Committee in accordance with Clause 2.7 (SIR Management Committee Contact) at the earliest opportunity.

4.4.2 Equipment Not Required to be Accepted

It is recommended manufactures and/or suppliers of equipment used to interface with Distributor assets and not required to be submitted for acceptance, submit their proposed equipment and installation arrangement to the Management Committee for comment prior to use where there is no clear evidence of compatibility or compliance with the Distributors assets and these Rules.

Examples of such equipment include service protection devices, supply connection facilities, CT metering facilities, service brackets and metering enclosures not required to be accepted.

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The relevant Distributor may require certified evidence of such equipment's compliance to the Rules specification and its suitability for its intended purpose. The relevant Distributor may accept such equipment, provided they are satisfied with the evidence provided.

Certified evidence may include provision of documents to certify compliance with the specification contained in these Rules and its intended purpose by a suitably qualified person, eg, an engineer, inspector or practitioner.

A Distributor may refuse to connect equipment where they are not satisfied that the relevant specifications have been met, and/or where suitable certified evidence is not provided.

4.5 Labelling

Every label required by these Rules shall be permanent, indelible, legible and suitable for the purpose for which it is intended. For guidance, labels should be of laminate and manufactured with letters and numbers of not less than 6mm in height.

4.6 Access to Distributors' Equipment

A customer must provide the Distributor's representatives at all times a safe, convenient and unhindered access to their equipment in accordance with these Rules and the Electricity Distribution Code for any purposes associated with the supply, metering or billing of electricity, inspection and/or testing of the customer's electrical installation including connection, disconnection or reconnection of supply.

4.7 Victorian Power Industry Lock

A Victorian Power Industry Lock is required where a Customer is obliged to or wishes to install a locking system to doors and enclosures which require dual access by both the Customer and Distributor representatives.

Locations for the use of the locks may be for perimeter gates, meter enclosures and supply connection facilities requiring unimpeded access by both the Distributor and customer.

The system uses a Victorian Power Industry (VPI) Lock that is available in many lock styles, and which is available from many hardware outlets, electrical wholesalers and master locksmiths throughout Victoria.

The locks may only be operated by the customer's key and authorised Distributor representatives using a Master Key.

Unique customer keys are supplied with individual locks. However a "key alike" system is available for the customer's key which enables the customer to use their key on as many of their VPI locks as they choose. This enables customers to customise their locks to other locks compatible with the system.

The locks shall be subject to the following conditions:

- The locking system is only used where specifically referred to and permitted by these Rules
- Other locks may be customer keyed to this system but the Master Key will only operate the Power Industry Lock.

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Figure 4.1 Victorian Power Industry Lock

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Section 5

Supply Application, Connection & Disconnection

 $\ensuremath{\textcircled{O}}$ AGL Electricity, Citipower Ltd, Powercor Australia Ltd, TXU and United Energy Distribution

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5.1 Conditions of Supply

A Distributor's electricity contract or agreement applies to all electrical installations connected to a Distributor's electricity network. The contract or agreement specifies conditions for the supply of electricity from the network to the specific electrical installation.

The contract or agreement may be:

- an Electricity Supply Contract with a Retailer; and
- a specific electricity distribution connection agreement or contract; or
- a deemed electricity distribution contract.

And where applicable:

- an Extension Agreement with the Distributor; and/or
- an electricity distribution demand tariff agreement or contract

For example a specific electricity distribution connection agreement or contract and/or an extension agreement provides various agreed conditions for the connection of a particular electrical installation to the electricity network. These may include costs, responsibilities, type, capacity and point of supply, standards to be met, timeframe for provision of supply, etc.

Generic conditions of supply may or may not be included in the specific contract or agreement. These conditions are contained in legislation such as the Electricity Safety Act, the Electricity Industry Act and regulations, codes of practice and guidelines enabled by those Acts. For example compliance with the Distributor's "reasonable technical requirements", ie, these Service and Installation Rules, is a condition of supply specified by the Electricity Distribution Code.

5.2 Negotiations for Obtaining / Altering an Electricity Supply and Warning Against Premature Expenditure

Negotiations for the conditions for supply to a new electrical installation, or an addition or alteration to an existing electrical installation, or an additional load, including provision of a supply pit, should commence with the relevant Distributor as soon as the decision to proceed is made. Adequate written notice of the customer's proposed requirements should be submitted in accordance with clause 5.4 (Application for Supply) and clause 5.5 (Notification of Electrical Work) at the earliest opportunity possible and the customer should be prepared to meet costs involved.

Sufficient time must be allowed for the Distributor to plan, determine and negotiate appropriate supply arrangements.

No expense should be incurred by a prospective customer until negotiations for supply have been completed with the Distributor and advice received as to the conditions under which the Distributor would agree to the connection of the load and the provisions to be made by the customer for the electrical installation of the Distributor's equipment on the premises.

These conditions may affect the design of the project, such as the determination of the point and type of supply, the position of the metering and servicing equipment, the point of attachment of an aerial service cable or point of entry of an underground service cable, and the position of any substation on the premises.

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5.3 Typical Connection Process

- 1. The Customer determines the supply requirement to suit their proposed electrical installation with their agent (eg, REC or electrical consultant).
- 2. Customer or Customer's Agent applies to Distributor for supply. Distributor requires advance notification of work required to be performed by the Distributor.
- 3. Distributor and Customer negotiate conditions for supply to the property.
- 4. Customer selects electricity Retailer and negotiates retail tariffs.
- 5. Customer Agent ascertains the electrical installations supply and metering requirements, completes electrical installation and provides Customer's Retailer with Electrical Work Request form, (available from Electricity Distributors), and the Certificate of Electrical Safety or CES procurement information.
- 6. Customer or Customers Agent applies to Retailer for connection.
- 7. Retailer's Meter Provider installs meters and requests Distributor to connect the electrical installation.
- 8. Distributor connects and energises electrical installation to supply.

5.4 Application for Supply

5.4.1 Applications

Customers with supply inquiries related to any electrical installation and customers requiring supply for the electrical installation types detailed in clauses 5.4.1.1 to 5.4.3 should contact the relevant Distributor detailed in Section 3 (Distributor Areas and Contact Details) as soon as a decision is made to proceed.

Applications for the proposed supply must be in a form acceptable to the relevant Distributor.

Supply will be negotiated following receipt of the application for supply.

5.4.1.1 High Voltage Electrical Installations

Applications are required for the following:

- Any new electrical installations including embedded generators and co-generators;
- Electrical installation alterations affecting supply protection arrangements; and
- Any changes effecting loading or contract conditions.

Refer to Section 9 High Voltage Electrical Installations for other requirements

5.4.1.2 Low Voltage Electrical Installations

Applications are required for the following:

(a) New Electrical Installations

- Where supply is not available;
- Where supply has not been negotiated and allocated;
- Where supply negotiated and allocated to a developer is less than the proposed loading;
- Where proposed loadings exceed the existing contract or agreement;
- Where the electrical installation is proposed to incorporate an embedded generator, grid connected inverter, co-generator, or alternate source of supply; and
- Any electrical installation proposed to be located or partially located in public land and/or on a Distributor's pole.

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(b) Existing Electrical Installations

- Where a significant load increase is proposed;
- Where proposed loadings exceed the existing contract or agreement;
- Any proposed increased in load on a SWER distribution system;
- Where the electrical installation is proposed to incorporate an embedded generator, grid connected inverter, co-generator, or alternate source of supply;
- Where supply negotiated and allocated to a developer is less than the proposed loading; and
- Where extra phases or capacity to an electrical installation is required and/or proposed type of supply is not available.

5.4.1.3 Electrical Installations on Public Land

Applications are required for the following:

The relevant Distributor must be contacted prior to consolidating any proposal to install an electrical installation on public land or extending wiring and equipment from an electrical installation into or across public land.

Rules regarding acceptable arrangements may be referenced in Clause 7.8.4 (Private Electric Lines on Public Land).

5.4.2 Subdivisions

A copy of the proposed Plan of Subdivision should be submitted to the relevant Distributor during its planning stage or as soon as a decision to proceed is made.

Applicants should nominate proposed loadings for any proposed lots, and consider existing supply arrangements and the potential necessity for existing supply arrangements to be altered where applicable, prior to presenting any submission.

Rules regarding acceptable arrangements may be referenced in Clauses 7.8.8 (Subdivisions)

5.4.3 Distributor Substation on Customer's Premises

If, in the opinion of the Responsible Officer, a substation on the premises is necessary to provide a new or increased supply, the requirements will be detailed with the offer of specific conditions of supply.

5.5 Notification of Electrical Work

5.5.1 New Connections & Work not requiring an appointment

Upon or prior to the electrical installation's completion, connection and/or alterations of the connection to supply is required, the customer, customer agent and/or Retailer is responsible to provide required notification and details of the work to the relevant Distributor.

The documentation should be submitted at the earliest opportunity as a delay in receiving this information may result in a delay of the work taking place at the desired time.

This notification is required so the Distributor is aware of the work details and for the Distributor to arrange to connect the work or alter their assets to suit the work performed at the appropriate time.

Documentation shall be submitted to the relevant Distributor for these purposes and the most frequently requested work is included in Table 5.1:

Document	Availability & Submission	Submit For
Electrical Work	Available from Distributors and completed	All work except abolishment's, eg:
Request* (EWR)	and submitted by the Customer Agent to	New Electrical Installations.
	the relevant Retailer or Distributor.	Service Pit installation
		Existing Electrical Installations, alterations, additions involving network assets and/or significant additional load.
		Faults involving repairs by the customer or customer's agent where required by the relevant Distributor.
Copy of the Prescribed Certificate of Electrical Safety (CES)	Obtained from OCEI, completed by the REC or LEIW responsible for the work and licensed electrical inspector, and submitted by the appropriate Customers Agent to relevant Retailer or Distributor.	For all new electrical installations Alterations and additions to existing electrical installations and faults where offered by the customer's agent, and
	Retailers forward document and/or information regarding CES procurement to relevant Distributor.	Distributor.
Non-prescribed Certificate of Electrical Safety (CES) Details	Obtained from OCEI, completed by the REC or LEIW responsible for the work and submitted by the appropriate Customers Agent to relevant Retailer or Distributor.	Alterations, Additions and Faults where required by the relevant Distributor.
	Retailers forward document and/or information regarding CES details procurement to relevant Distributor.	
Certified Evidence that an Installation is Safe To Reconnect, eg, EWR, CES or letter.	A LEIW or Licensed Electrical Inspector to the relevant Distributor.	Re–Connection of Electrical Installations with rectified Defects or Off Supply Over 12 Months.
Field Works Order*	Available from Distributors. Customer or Customer Agent requesting work to submit the completed document to Distributor prior to Distributor commencing requested work.	Where the Customer or Customer agent who requests Distributor work to take place re-assigns Distributor charges to another party.
Application for Abolishment of Electrical Supply*	Available from Distributors. Supply Connected : To be submitted by the customer to their Retailer. Retailer to submit request to relevant Distributor.	Electrical Installation: Where the applicant requests permanent removal of supply assets and Distributor's metering associated with the electrical installation.
	Supply Not Connected : To be submitted by the customer or Customer's Agent to the relevant Distributor.	Occupancy: Where the applicant requires permanent removal of the Distributor's metering, and if applicable, supply assets.
Retailer's Service Order	Retailer service order that Retailers submit to the relevant Distributor.	In all cases where the Retailer requires the Distributor to perform work, eg:
		New electrical installations.
		Existing Electrical Installations including alterations, additions, faults, disconnections and reconnection, meter reads alterations repairs or faults
* Blank copies of these doc	uments are placed at the end of section 5 for y	our convenience. These documents may
be copied, completed and su	ubmitted in accordance with this table.	

 Table 5.1 Documents for Most Frequently Requested Work

5.5.2 Work requiring an appointment

In addition to submission of documentation specified in Clause 5.5.1 (New Connections & Work not requiring an appointment), to avoid delays, the customer's agent should contact the relevant Retailer or Distributor at the earliest opportunity for an appointment where the installation work needs to be co-ordinated with the Distributor, eg, "truck appointments". Delays in receiving this information may result in impeding the work taking place at the desired time.

5.5.3 Other Documentation

Other documentation is required for work associated with less common connection work. Examples of such work include multiple occupancies, working near network assets, HV electrical installations (refer to Section 9 High Voltage Electrical Installations), relocation of network assets etc.

Details of documents required to be provided for these categories of work may be obtained from the relevant Distributor.

5.6 Charges

In addition to charges made by the Distributor for supply negotiated under Clause 5.4 (Application for Supply), a customer or customer agent will usually be required to pay a charge for customer initiated work carried out by a Distributor for the connection or alteration or additions involving Distributor assets and their installation.

Some examples of these charges include where:

- connection of supply is provided;
- alterations involving the existing service or metering equipment are requested;
- the service or metering equipment is considered by the Distributor to be special or additional;
- work is requested to be performed outside normal business hours; the customer or their agent fails to complete essential preparations or causes excessive delay after arrival of a service truck; and
- in the opinion of the Distributor, any alteration to the supply arrangements is required as a result of failure of the customer to comply with these Rules and the conditions under which the supply is made available.

Copies of many such charges can be referenced on Distributors and Essential Services Commission websites – see "references section" of this document. Details of charges should be determined and/or confirmed with the relevant Distributor prior to the work taking place.

The customer or customer agent shall, if requested, sign an agreement in a form acceptable to the Distributor, before the Distributor's work is commenced, and may be required to pay prior to commencement of the work.

ELECTRICAL WORK (Submit to responsible Retailer or Distribution	K REQUEST on Company for all work requiring Distribution Company involvement)	To:(Retailer or Distribution Co	mpany)
С	CUSTOMER:		PHONE No.:
WORK S	TREET NAME & No.:		LOT No.:
SITE			
ADDRESS: S	UBURB/LOCALITY:	POSTCODE:	MELWAY REF:
INSTALLATION: Hous Private Overhead Lir	se Flat/Unit Shop Factory ne Hazardous Area H/V Office	Farm Builders Po	le Dual/Multi Occupancy D
TYPE OF WORK: ALT	TERATION / ADDITION Brief Work Description:	:	
SUPPLY CONNECTER	D: YES NO ACCESS: Premises Open Wo	orkmen on site 🗌 Power Ir	nd. Lock 🗌 Other
SUPPLY REQUIRED:	OVERHEAD Length of Service Cable	e (If Multiphase)	metres
Further details of installed	U/GROUND	oit been installed Y 🗌 N 🗌	Is pit required? Y
equipment may need to be		Γ	Conversion O/Head to U/G
provided to, and the responsible			TION OTHER
Company may		FOLCB PIT	PILLAR
confirmation of supply arrangements.	X DEMAND: Amps per phase Installation)		
METERING: EXISTIN	IG METER NUMBER/s	RETAILER (If Known)
REQUIRED Domesti	ic 🗌 Commercial / Industrial 🗌 Farm 🗌 🤇	Other 🗌	
	No. Pha	ases	
Single Ra Two Rate With off p	ate 24 Hour x 7 Days 1 2 ate includes Off Peak options 1 2 ate includes Off Peak options 1 2 ate includes Off Peak options 1 2	3	Single or Twin Element
With off p	peak space heating may not be available 1 2	3 KW Rating/per pha	ISE
Climate S	Saver (Powercor only) from all Retailers) 1 2	3	
SIR Wirir	ng Diagram page # Switching S	Service Required	
Current Transformer Me	tering Max DemandAmp	s Other 🗌	
TRUCK APPOINTMEN	T: uired can the Distribution Company complete the work w	vithout you being in attendar	
If Truck Appointment is	required agreed time/date with Distribution Company.		
I will accept all charges	for the truck appointment I have provided a Fie	eld Works Order to defer the Not all Distribution Companies accept a l	charges to another person Field Works Order)
INSPECTION: Do you r	equire the Dist. Company to Provide this Service? No	Yes 🗌 (Not all Distribution	n Companies provide this service)
The CES will be: Delive	ered to Office Provided at Appointment Av	vailable on site from / _	/ (date must be completed)
CES Number:	Licensed Electrical	Inspector:	(if not Distribution Company)
[Note: Prescribed work requires inspection and issue	of a Certificate of Electrical	Safety (CES)
I acknowledge that the certify the electrical Electrical Safety Reg Electrical Safety and submitted with this for	by submission of this notice the requirements of the work this notice pertains to complies with the cu- ulations. I also acknowledge the initial connection of p that I am responsible for any associated Distribution rm to defer this responsibility to another person.	relevant Distribution Comp nrrent Victorian Service an prescribed work will not be Company charges unless a	pany have been adhered to, and d Installation Rules (SIR's) and connected without a Certificate of a completed Field Works Order is
	OTICE IS FOR PRELIMINARY ADVICE ONLY; AND SUBMIT FULLY COMPLETED COPY WHEN THE WOR	K IS COMPLETED AND RE	EADY FOR SUPPLY.
THE WORK WILL BE	SAFE TO CONNECT ON: DATE:	OR at Completion of	Truck Appointment
REGISTERED ELEC	TRICAL CONTRACTOR:	R	EC No.:
REGISTERED ADDR	ESS:	P	HONE No.:
		F	AX No.:
	SON: (Please Print)		MOBILE No.:
SIGNATURE:		D	ATE:////
Privacy Statement:	Information collected is for the purposes related to	o connection, provision an	d alteration of supply of electricity.
This information ma Citipower Pty - 9297	y be disclosed to your Electricity Retailer and releval 6664 🗌 Powercor Australia Ltd - 132 206 🗌 TXU	nt Distributor identified he Networks - 1300 360 795 [re: AGL Electricity - 131 245 United Energy 1300 131 689

Victorian Electricity Supply Industry

Field Works Order

Location of works			•••••					
			•••••		••••••			
Customer / Occupier Name			•••••					
Account or meter number (if kr	nown)		•••••					
Time works required: Day		Date	/	/		am	. : pm	L

NOTE: Appointments must be confirmed with the Distribution Company

Description of works

Item	No.	Wor	Work Required		
			TOTAL F	EE PAYABLE	
Applicant	Name of o	organisation			
BLOCK	Name of r	berson requesting works			
LETTERS	Position	1 0			
PLEASE	Address				
				phone No	
I hereby requ	uest		n company supplying th	e above premises) to und	ertake the works
described ab	ove and agree	to pay the account for same prior to the work ta	aking place or within 30) days of issue.	
Lalso unders	stand and ackr	nowledge that in the event of non-navment of thi	s account the disributio	on company may refuse to	perform further
works I may	request unles	s and until such account is settled.		in company may refuse a	
Cignoture	of Applican	*			
<u>Signature</u>	or <u>Applican</u>	<u>L</u>			
Postal Add	<u>iress for my</u>	<u>oice:</u>			
Contractor	involvod				
Contractor	IIIvoiveu		Tala	nhana Na	
Domortza				phone 100	
Remarks					
Payment C	<u>Dptions:</u>	(Note: some Retailers or Distribution C	Companies may not	accept credit card pay	/ment)
PleasePlease	charge the	following credit/debit card: \[Visa	□ Bar	nkcard \Box Ma	astercard
Card Num	ber:		Card Expiry Date:		
Card Hold	ler's Name:		1 2		
Signature:					
Informatio This inform AGL Elect TXU Netwo	on collected mation may tricity 131 vorks 1300	is for the purpose related to connection, be disclosed to Electricity Retailer and 245 Citipower Pty 9297 6 360 795 United Energy 1300 1	provision and alter relevent Distributor 664	ation of supply of ele identified here: owercor Australia Ltd	etricity. 132 206 □

Application for Abolishment of Electrical Supply (VESI Form)

Note: The applicant requests the **permanent removal** of all metering and servicing associated with the property detailed below.

To ensure the prompt processing of your application please ensure all details requested are accurately completed. Incomplete applications will be returned to the applicant.

accurately completed. Incomplete applications w	in be returned to the applicant.
Site Details	
Address of Electricity Supply to be abolished.	
Site Access Details	
Accurate site access details are critical to ensure the work ca insufficient for the work to be completed a standard service to	an be carried out. In the event that the access arrangements provided are ruck fee will be charged to you to the visit.
Type of Service to be Abolished	
Overhead	Underground cable supplies
Multiple services to the site	Substation direct supplies
If more than one service to the site exists please indicate wh	ich supply is to be removed.
Metering to be Abolished	
Supplying accurate meter numbers assists us to identify the	correct service to be abolished and reduces timeframes for works required.
Meter Number(s)	
Preferred Date to be completed	
The date requested represent	the Applicante preferred date for abeliabment of the convice. The actual
date the works will be complete	ed is subject to the resources available and extent of the works required.
Applicant Details	
Name (Company Name if applicable)	CAN/ARBN/Driver's License No
Address for Invoice (if applicable)	
Telephone Number	Fax Number
Mobile Number	
Applicants Authorised Signatory	Name (please print)
Privacy: This information is collected by your Distribution Co Your Distribution Company may disclose this information to a For more information on your Distribution Company's privacy Distribution company identified here:	Impany for the purpose of abolishing the electricity supply to your premises. In other organisation for the purpose of abolishing your electricity supply. In policy and your right to access personal information, contact your relevant
AGL Electricity 131 245 Citipowe TXU Networks 1300 360 795 United F	Pr Pty 9297 6664 Powercor Australia Ltd 132 206
Return Fax Number	Enquiries

NOTE: If supply is connected this form must be submitted to the customer's Retailer.

If supply <u>is not</u> connected this form must be submitted to the relevant Distribution Company responsible for the supply address.

Section 6

Supply Characteristics and Supply Use

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6.1. Supply

6.1.1 Supply Systems

Electricity supplied throughout Victoria is in the form of alternating current of approximately sinusoidal waveform at a frequency of 50 Hz. Electricity Distributors' endeavour to maintain the voltage at the Point of Supply in accordance with the Electricity Distribution Code (Refer Table 1. and the Code) and may superimpose control signals on the normal supply voltage.

At the time of publication:

- Standard nominal voltages are 240 V, 415 V, 480 V, 6.6 kV, 11 kV, 22 kV and 66 kV; and
- Standard Low Voltage Systems are 3 phase 4 wire 415/240 V, and Single phase 240 V and 3 wire 480/240V Systems; and

It has been proposed that standard nominal low voltages be 3 phase 4 wire 400/230V, single phase 230V and 3 wire 460/230V. However, these systems and voltages have not been adopted at the time of publication.

Voltage Level in kV	Volt	Impulse Voltage		
	Steady	Less than	Less than 10 seconds	
	State	1 minute		
<1.0	±6%	± 10 %	Phase to Earth +50%-100%	6 kV peak
			Phase to Phase +20%-100%	
1-6.6	±6%	± 10%	Phase to Earth +80%-100%	60 kV peak
11	(± 10 %		Phase to Phase +20%-100%	95 kV peak
22	Areas)			150 kV peak
66	± 10%	± 15%	Phase to Earth +50%-100%	325 kV peak
			Phase to Phase +20%-100%	

Table 6.1 Standard Nominal Voltages and Voltage Variations

6.1.2 Prospective Short Circuit Current

The Wiring Rules require electrical installations to be designed with consideration to the prospective short-circuit current under short circuit conditions within the electrical installation.

For the purpose of this clause a bolted short circuit means a fault of negligible impedance at the point of short circuit.

Dependent upon the relative location of the electrical installation's connection to the electrical distribution system the prospective short-circuit current at the consumer terminals will vary. This variance is due to the electrical distribution system characteristics such as size and impedance of the transformer and impedance of cables supplying the consumer terminals.

For electrical installations connected to low voltage supply, except as provided for below, the prospective short-circuit current at the consumer terminals shall be deemed to be 6kA phase to earth, and 10kA between phases for 0.1 of a second, and 0.04 of a second immediately beyond the fuse where a service fuse cartridge is fitted.

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Higher prospective short-circuit current values apply to consumer terminals close to transformers of a capacity of 500kVA and from transformers of greater capacity. In these cases, the relevant Distributor should be contacted to provide the actual prospective short-circuit current value and its duration at the particular location.

Lower prospective short-circuit current values than the 6kA and 10kA stated above may apply in some locations where the supply arrangements are not expected to change for the anticipated lifespan of the installation. In these cases, where the 6kA and 10kA values are not adopted, and also where the prospective short-circuit current value at a particular electrical installation's location is uncertain, the relevant Distributor should be contacted in accordance with the details in Section 3 to provide the prospective short-circuit current.

Details of prospective short-circuit currents and their duration relating to high voltage installations are provided in clause 9.10 (Short Time Withstand Current).

6.2. Point of Supplies

6.2.1 Property

For the purpose of these Rules "Property" means land on which the single electricity customer or controlling body or their representatives have the right to install their electrical installation.

A property may include:

- (a) a single parcel of freehold, leasehold and/or public land, and/or land held under lease or licence on which the customer or controlling body has the right to install their electrical installation;
- (b) any combination of contiguous land to which the customer or controlling body has the right to install their electrical installation; and
- (c) contiguous land and/or individual titles to which a corporate body, customer and or controlling body has the right to install their electrical installation;.

An expressed easement through adjacent property to which the customer or controlling body does not have occupancy rights is not considered to form part of a property for the purpose of the establishment of a Point of Supply.

In the event that the boundary of the property to be supplied is not clearly defined, the prospective customer shall be responsible to physically and accurately define the boundary of the property to the satisfaction of the Responsible Officer.

6.2.2 Point of Supply

6.2.2.1 Definition

Point of Supply (POS) – the point at which the electricity Distributors service cable or supply main connects to the consumer terminals. (Refer Section 1 – Definitions)

6.2.2.2 Provision

The Distributor, following application in accordance with clause 5.4 (Application for Supply), and during negotiations for supply, will nominate the location and provide one point of supply for each property.

However, in certain situations the relevant Distributor may agree to a customer's written request for more than one point of supply. Examples of where more than one point of supply may be agreed are:

- Engineering considerations such as load and distance;
- Where subdivision may take place; and
- Existing titles comprising of one property where rights to individual titles and/or parcels of land may change.

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Where it is proposed to cross a major asset of another Authority within the customer's property, the customer shall consult with that Authority and the relevant Distributor regarding the requirements of the other Authority or an alternative means of providing supply to the property.

6.2.2.3 Location

In all cases, the Distributor reserves the right to determine the location of the point of supply and method of supply.

The following are points of supply and consumer terminals location relative to the type of supply.

Refer to Clauses 7.2.1 (Underground Supplies-Consumer Terminals) and 7.3.3 (Overhead Supplies-Consumer Terminals) and Section 9 High Voltage Electrical Installations for specific details of POS and consumer terminal arrangements for low and high voltage supplies.

SUPPLY TYPE	POINT OF SUPPLY/CUSTOMER TERMINALS LOCATION
AERIAL SERVICE	Within 500mm of the first point of the service cable attachment within
CABLE	the property or on the premise.
UNDERGROUND	
Supply pit	In the pit adjacent the property
Supply cable	Within a supply connection facility at, or with the Distributor's agreement, a short distance from the property boundary.
Ground, Kiosk & Indoor Type	As nominated by the Distributor – normally at or as close as practicable to the substation terminals.
Substation on property	
Pole & Pole Type	As nominated by the Distributor – normally 4m from ground level.
Substation	
High Voltage	The point agreed between the relevant Distributor and Customer

 Table 6.2 Point of Supply/Customer Terminals Location

6.3. Consumer Terminals

The Distributor reserves the right to determine the location of the Consumer's Terminals including the method of supply, and may require the customer to arrange facilities for the installation of the service cable and conduits at the customer's expense.

6.3.1 Definition

Consumer Terminals – means the junction at which the consumer mains connect to the Distributor's service cable or supply mains conductors. (Refer Section 1 – Definitions)

6.3.2 Number of Consumer Terminals per Point of Supply

No more than one set of consumer terminals shall be connected to a point of supply.

The relevant Distributor may agree to a customer's request for the connection of more than one set of consumer terminals to a point of supply dependant upon the circumstance.

6.3.3 Identification of Consumer Terminals

Consumer terminals shall be labelled adjacent to the terminals in accordance with Clause 4.5 (Labelling) to identify the electrical installation they supply in the following circumstances:

- Where more than one set of consumer terminals are supplied from a common point of supply; and
- Where the consumer terminals are located within a supply pit.

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6.4 Supply Arrangement Diagrams

In addition to the requirements of the Electricity Safety Act and Electricity Safety (Installations) Regulations the following Rules apply where, in accordance with the provisions of Clause 6.2.2 (Point of Supply):

- more than one point of supply is provided to a property and/or more than one set of consumer terminals are connected to a point of supply; and
- there is a risk of incorrect identification of:
 - the property's supply arrangements; and
 - segregation between the electrical installations and occupancies un-metered wiring, switchboards and metering.

The supply arrangement diagrams shall be permanent, indelible, legible and dimensioned with a margin of error not exceeding 500mm. The diagrams must show the location of the point of supply for each electrical installation, the un-metered wiring, the metering points and each switchboard location shall be installed within the main metering location and/or main un-metered switchboard – whichever applies.

Where multiple meter locations are connected to an electrical installation the diagram installed at that location shall identify the supply point and wiring supplying the meter position, and the location of the occupancy switchboards supplied from that meter position.

The customer is responsible for the provision and maintenance of the diagrams and to ensure they are permanent, legible and up to date at all times.

6.5. Supply Loading

6.5.1 Obligations

At the time of publication Clause 3.2 of Electricity Distribution Code included obligations for customers to use best endeavours to ensure:

- (a) protection equipment in the customer's electrical installation is at all times effectively coordinated with the electrical characteristics of the distribution system; and
- (b) ensure that the distribution system and the reliability and quality of supply to other customers are not adversely affected by the customer's actions or equipment.

Additional requirements of the Code are duplicated in these Rules for convenience of reference.

However the current Code should be referenced for specific details. This clause also contains some specifications that are not included in the Code.

6.5.2 Non Compliance

If, in the opinion of the Electricity Distributor, a person should use or deal with electricity supplied in such a manner as to cause undue interference with the supply to other customers or to any third party, the Distributor may direct the customer to take corrective action and, in the event of failure to comply with such directions, the Distributor may discontinue the supply of electricity to the electrical installation or occupancy.

The fact that the Distributor may have permitted connection of the apparatus or equipment causing the interference shall not exempt the customer from the application of this Clause.

6.5.3 Power Factor

At the time of publication Clause 4.3 of the Electricity Distribution Code stated:

A *customer* must ensure that the *customer's demand* for *reactive power* does not exceed the maximum level allowed by applying the *power factor* limits specified in Table 2 to the

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customer's maximum *demand* for *apparent power* (measured in kVA) or *active power* (measured in kW).

If, for the purposes of clause 4.3.1, the *customer's* maximum *demand* for *apparent power* (*Rmax*) is used, then the *customer's* allowable *demand* for *reactive power* (*Qmax*) is calculated using the formula $Qmax = Rmax^*(1-pfmin_2)_{1/2}$, where *pfmin* is the minimum power factor specified in Table 2.

If, for the purposes of clause 4.3.1, the *customer's* maximum *demand* for *active power* (Pmax) is used, then the *customer's* allowable *demand* for *reactive power* (Qmax) is calculated using the formula $Qmax = (Pmax/pfmin)^*(1-pfmin_2)_{1/2}$, where pfmin is the minimum power factor specified in Table 2.

If the *customer's* network tariff includes a charge for the maximum *demand* for *apparent* or *active power*, then, for the purposes of this clause 4.3, the *customer's* maximum *demand* for *apparent* or *active power* is to be taken to be the maximum *demand* for which it was most recently billed.

Despite clause 4.3.1, a *customer* must use best endeavours to keep the *power factor* of its *electrical installation* within the relevant range set out in Table 2 when the *customer's demand* for *active* or *apparent power* is at or more than 50% of the *customer's* maximum *demand*.

	POWER FACTOR LIMITS					
Supply Voltage in kV	Supply Power Factor Range for Customer Maximum Demand and Voltage Voltage in kV					
	Up to 100 kVABetween 100 kVA - 2 MVAOver 2 MVA			2 MVA		
	Minimum Lagging	Minimum Leading	Minimum Lagging	Minimum Leading	Minimum Lagging	Minimum Leading
< 6.6	0.75	0.8	0.8	0.8	0.85	0.85
6.6 11 22	0.8	0.8	0.85	0.85	0.9	0.9
66	0.85	0.85	0.9	0.9	0.95	0.98

Table 6.3 Table 2 of the Electricity Distribution Code

6.5.4 Harmonics

At the time of publication Clause 4.4 of the Electricity Distribution Code stated in part:

A customer must keep harmonic currents below the limits specified in Table 4 and otherwise comply at its nearest point of common coupling with the IEEE Standard 519-1992 'Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems'.

	CURRENT HARMONIC DISTORTION LIMITS					
	Maximum Harmonic Current Distortion in Percent of IL					
	Individual Harmonic Order "h" (Odd Harmonics) Total					
ISC/IL	<11	11 <u><</u> h <17	17 <u><</u> h < 23	23 <u>≤</u> h < 35	35 <u><</u> h	Harmonic Distortion
<20*	4.0%	2.0%	1.5%	0.6%	0.3%	5.0%
20<50	7.0%	3.5%	2.5%	1.0%	0.5%	8.0%
50<100	10.0%	4.5%	4.0%	1.5%	0.7%	12.0%
100<1000	12.0%	5.5%	5.0%	2.0%	1.0%	15.0%
>1000	15.0%	7.0%	6.0%	2.5%	1.4%	20.0%

Table 6.4 Table 4 of the Electricity Distribution Code

Notes:

1. Even harmonics are limited to 25% of the odd harmonics listed above.

2. Current distortions that result in a DC offset, e.g. half-wave converters, are not allowed.

3. *All power generation equipment is limited to these values of current distortion, regardless of actual Isc/I_L .

4. Isc = maximum short-circuit current at *point of common coupling*.

5. I_L = maximum *demand* load current (fundamental frequency component) at *point of common* coupling.

The Wiring Rules also has a requirement for electrical equipment not to cause adverse effects and interference (such as harmonics) to other equipment.

6.5.5 Load balance

At the time of publication Clause 4.7 of the Electricity Distribution Code stated:

A *customer* must ensure that the current in each phase of a three phase *electrical installation* does not deviate from the average of the three phase currents:

- (a) by more than 5% for a standard nominal *voltage* up to 1 kV; and
- (b) by more than 2% for a standard nominal *voltage* above 1 kV.

Despite clause 4.7.1, deviations are permissible for periods of less than 2 minutes:

- (a) up to10% for a standard nominal *voltage* up to 1 kV; and
- (b) up to 4% for a standard nominal *voltage* above 1 kV.

6.5.6 Disturbing Loads

At the time of publication Clause 4.8 of the Electricity Distribution Code stated in part:

Subject to clause 4.8.3, a *customer* must ensure that the *customer's* equipment does not cause *voltage* fluctuations at the *point of common coupling* greater than the levels specified in *AS/NZ* 61000.3.5:1998 and *AS/NZ* 61000.3.7:2001 as appropriate.

If two or more *customers' electrical installations* are *connected* at the same *point of common coupling*, the maximum permissible contribution to *voltage* fluctuations allowable from each *customer* is to be determined in proportion to their respective maximum *demand*, unless otherwise agreed.

6.5.7 Switched Loads

To meet the specifications regarding load balance and disturbing loads with supply the following advice may assist:

In many electrical installations individually switched loads rated in excess of the value specified below should not be connected between an active and the neutral conductor.

- Single Phase 480/240 Volt areas of supply 20 Amperes
- Three Phase 415/240 Volt areas of supply 25 Amperes

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6.5.8 Voltage Drop

The Wiring Rules specify the allowable voltage drop within an electrical installation.

6.5.9 Equipment Requiring Special Consideration

The relevant Distributor may refuse to permit or apply conditions and/or tests for the connection of equipment in the following categories if it considers that by such connection, the supply to other customers would be adversely affected –

- (a) Equipment which could cause excessive fluctuation of voltage on the Distributor's system as a result of its large or fluctuating demand, e.g. Non linear load control such as variable speed motors, gas discharge lighting, arc furnaces, welding machines, X-ray units, frequently-started large motors, etc.
- (b) Equipment which could cause excessive distortion of the wave shape of the Distributor's system voltage, e.g. rectifiers, frequency converters, load control devices using thyristors or saturable reactors, etc.

No expense should be incurred by any customer or prospective customer until an application has been made to the relevant Distributor and advice has been received that the supply will be given and upon what terms and conditions it will be given.

6.5.10 Starting Current of Motors

6.5.10.1 General

The current taken by a motor of a type mentioned in this Clause under the conditions of starting shall not exceed the values in Table 6.3 and Table 6.4 when measured by the methods outlined in Clause 6.5.11 (Test Method of Measurement of Motor Starting Current).

6.5.10.2 Three Phase Motors 415 Volt

The kW output of motors installed refers to the motors connected to the particular electrical installation from which the proposed motor is to be supplied and includes the proposed motor, provided that no limitation need be placed on the starting current of any three phase motor which is not frequently started and the rating of which does not exceed 10 per cent of the total motor load installed.

In electrical installations which are supplied directly from a substation or where special supply conditions exist, starting currents in excess of those set out in Table 6.3 sections (b) and (c) may be permitted if permission has been obtained from the Responsible Officer.

MOTOR SIZE	ALLOWABLE CURRENT – I
not exceeding 1.5 kW	I = 26 Amperes
exceeding 1.5 kW, but not exceeding 3.75 kW	I = (kW x 17.5) Amperes
	(a) I = (kW x 3.5) + 53 Amperes, or
	(b) I = total kW of motor installed x 1.1 Amperes, or
Exceeding 3.75 kW	I = the starting current of the largest of the other motors installed calculated in accordance with sub-clause (a), whichever is the greatest.

Table 6.5 Three Phase Motors 415 Volts

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6.5.10.3 Single Phase Motors

MOTOR VOLTAGE	MOTOR SIZE	ALLOWABLE CURRENT – I
240 Volts	All sizes	I = 45 Amperes
	Not exceeding 1.5 kW	I = 45 Amperes
	Exceeding 1.5 kW,	I = (kW x 9.5) + 26 Amperes
480 Volts	But not exceeding 3.75 kW	
	Exceeding 3.75 kW,	I = (kW x 6.5) + 35 Amperes
	But not exceeding 30 kW	
	Exceeding 30 kW	I = (kW x 7.4) + 15 Amperes

Table 6.6 Single Phase Motors

6.5.11 Test Method for Measurement of Motor Starting Current

The starting currents of alternating current motors shall be determined by either of the following methods –

6.5.11.1 Fall in Voltage Method

The starting current shall not cause a fall in voltage of more than 5 per cent for more than 0.02 seconds when connected to a typical 415/240 volt, three phase, 50 Hz supply having a supply system impedance of –

- 0.2 + j 0.2 ohms (phase-neutral)
- + j 0.1 ohms (line impedance per phase)

The fall in voltage shall be determined by the oscillographic method or any other method considered appropriate by the Distributor.

6.5.11.2 Current Measurement Method

The starting current may be determined by the locked rotor method with low voltage, 50 Hz, as appropriate, applied to the terminals of the motor. In the case of motors having rotors which cannot readily be locked, the current may be measured with a back–stopped ammeter or by other methods approved by the Distributor.

6.5.12 Back Feed

Except as permitted by clause 6.8 (Alternative Supplies), where a potential exists within an electrical installation to cause current flow or earth potential rise by back-feeding through the electrical installations equipment into the electricity supply system all necessary steps must be taken to prevent any back feed into the supply system.

If this potential exists, the customer must provide in the application for supply, details regarding how it proposes to prevent the occurrence of back-feeding.

6.6. Type of Supply and Load

The applicable supply contract or agreement referred to in Clause 5.1 (Conditions of Supply) specifies:

- the conditions for connection of the electrical installation to the electricity network;
- the type of supply including the voltage and number of phases; and
- the allocated supply capacity where this is applicable.

Except for electrical installations subject to a deemed electricity distribution contract, the conditions for connection, the type of voltage and number of phases and supply capacity, that

is, the allocated maximum demand or the allocated supply capacity can be determined from the customer's copy of the contract or agreement applicable to the electrical installation.

The relevant Distributor should be contacted as detailed in Section 3 (Areas of Supply) of this document to determine the supply arrangements where a customer does not have a specific electricity distribution connection agreement or contract or demand tariff agreement available and where a deemed electricity distribution contract applies.

The electrical installation loading shall be in accordance with the contract applicable to the electrical installation and arranged to comply with these Rules.

6.7. Supply Capacity

6.7.1 Application

Unless otherwise required by the relevant Distributor, supply capacity to electrical installations specified in this clause shall be controlled in accordance with clause 6.7.2 (Supply Capacity Control).

6.7.1.1 Electrical Installation subject to a demand tariff agreement or contract

All new electrical installations and existing electrical installations where the Distributor has specified in writing that the supply capacity be controlled, that are subject to a demand tariff agreement or contract that contains an allocated maximum demand shall be controlled so as not to exceed that supply capacity, ie, the allocated maximum demand.

6.7.1.2 Electrical Installations subject to a specific electricity distribution connection agreement or contract, or a deemed electricity distribution contract

The following electrical installations shall be controlled so as not to exceed a load equal to approximately 130% of their supply capacity for more than 2 hours:

(a) New Electrical Installations, where:

- i) The Distributor has specified in writing that the supply capacity be controlled; or
- The nature of electricity use by the electrical installation may interfere with the reliability or quality of supply to other customers, and in the opinion of the Distributor, supply capacity control would reduce or eliminate the interference; or
- iii) The maximum demand as determined under the Wiring Rules exceeds 100Amps per phase; or
- iv) The electricity supply is not metered.

(b) Existing Electrical Installations, where:

- i) The Distributor has specified in writing that the supply capacity be controlled; or
- The nature of electricity use by the electrical installation may interfere with the reliability or quality of supply to other customers, and in the opinion of the Distributor, supply capacity control would reduce or eliminate the interference; or
- iii) Any portion of the consumer mains is replaced and either:
 - a) The electrical installations maximum demand as determined under the Wiring Rules exceeds 100 Amps per phase; or
 - b) The electricity supply is not metered.

6.7.2 Supply Capacity Control

6.7.2.1 General

A device or devices other than a fuse cartridge shall control the supply capacity to electrical installations specified in clause 6.7.1 (Application).

Acceptable methods to control supply capacity include the use of Circuit Breakers and/or Load Management Systems that are acceptable to the relevant Distributor. Any other method that is proposed to control supply capacity shall be subject to the acceptance of the relevant Distributor.

Consideration should be taken to ensure supply capacity control equipment for electrical installations containing essential building services and general electrical installation non-essential supplies is co-ordinated to minimise any effect of the control equipment on the essential services.

In these cases, the essential building services equipment need not be subject to the electrical installations supply capacity control, provided the allocated supply capacity less the essential services equipment maximum demand is controlled in accordance with this clause.

6.7.2.2 Supply Capacity Control Device/s

(a) Circuit Breakers

- May be installed at any point between the point of supply and main switchboard in accordance with the Electricity Safety Act and Regulations, the Wiring Rules, and these Rules;
- Will normally be located and serve the purpose of:
 - the Service Protection Device/s provided they meet the requirements for those devices and this clause; or
 - the electrical installations main switch/s provided they meet the requirements of this clause and the Wiring Rules;
- Must be arranged to ensure the aggregate rating of the devices does not exceed the supply capacity where multiple devices are used; and
- Shall have access and means to seal any adjustable settings by the use of distributor seals or equivalent means.

Table 6.7 Circuit Breakers to Satisfy Clauses 6.7.1.1 and 6.7.1.2

Nominated Supply	CB manufactured to AS/NZS 3947.2:2002	CB manufactured to AS/NZS 4898:1997	CB manufactured to AS 3111
Capacity	Satisfy Sub-clause 6.7.1.1. and 6.7.1.2	De-rating required to Satisfy Sub- clause 6.7.1.2	Satisfy Sub-clause 6.7.1.2
20A	-	16A	20A
25A	-	20A	25A
32A	-	25A	32A
40A	-	32A	40A
50A	-	40A	50A
63A	-	50A	63A
80A	-	63A	80A
100A	-	80A	100A
125A	125A	100A	125A
160A	160A	125A	-
200A	200A	-	-
250A	250A	-	-
315A	315A	-	-
400A	400A	-	-
500A	500A	-	-
630A	630A	-	-
800A	800A	_	_

(b) Load Management System/s

To prevent loss of supply, situations where the installation of a load management system should be considered include:

- where the electrical installation incorporates essential building services such as fire and smoke control equipment, evacuation equipment and/or lifts;
- priority loads where the demand may approach the maximum supply capacity; and
- where loss of supply may have adverse customer effects, eg, loss of production.

6.8. Sources of Alternative Supply

6.8.1 General

Where a Grid interactive energy supply is proposed, the proposal shall be submitted to the relevant Distributor for approval at the earliest opportunity. Where applicable, the customer should also advise their Retailer of the proposal. The proposal shall include a schematic diagram of the electrical installation supply arrangements.

6.8.2 Connection of Break before Make Alternative Supply Sources

Where the Distributor agrees to connection arrangements that enable an electrical installation to be disconnected from the Distributor's supply system and connected to a private alternative source, the arrangements shall be such that the Distributor's system, service and metering equipment cannot be energised from such alternative source. This can be arranged either directly (electronically) or by suitable interlocking devices to prevent the simultaneous connection of the alternative supply to the Distributor's system. An example of an acceptable interlock arrangement is shown in Figure 6.1.

The opening or closing of any associated switchgear door or cover shall not affect the interlocking system. A prominent label shall be fixed on the main switchboard to show that such facilities exist, and the sections of the electrical installation they supply including their point of control.

If the alternative supply automatically comes into operation on the loss of mains supply, a means of isolating the alternative supply from the Distributor equipment shall be provided on the electrical installation main switchboard or Distribution Switchboard to which the alternative supply is connected.

Where a generator is directly connected under emergency conditions, the interlocking arrangement may be achieved by creating a physical break, eg, disconnection of cables, which requires other than normal operational means to restore.

The neutral shall not be switched or broken on the distribution supply (upstream) side of the M.E.N. connection.

Refer also to the Wiring Rules and AS 3010.1 "Electrical Installations – Supply by Generating Set".

6.8.3 Grid Connected Alternative Supplies

Specific requirements apply in respect of any proposal to incorporate parallel generation facilities within an electrical installation. These requirements are specified in the National Electricity Code, the Distribution Code, the Electricity Safety Act and Regulations and Australian Standards. It is therefore essential that the Distributor be formally consulted before any commitment to proceed is made.

6.8.4 Grid Connection of Energy Systems via Inverters

These Rules specify the electrical installation requirements for inverter energy systems with ratings up to 10 kVA for single-phase units, or up to 30 kVA for three-phase units.

6.8.4.1 Inverter Requirements

Only approved models that satisfy AS 4777 Part 2 "Grid Connection of Energy Systems via Inverters, Inverter Requirements and Part 3, Grid Protection Requirements" may be connected to the grid.

Type Test certification of compliance with this standard must be provided to the Distributor prior to the grid connection of the inverter.

6.8.4.2 Installation and Connection to Grid

The installation of the inverter shall be in accordance with the requirements of AS 4777.1 and AS 4777.3. and these Rules:

- The customer's inverter must be connected to a dedicated circuit on the customer's main switchboard or distribution switchboard closest to the inverter via a lockable isolating switch;
- The switchboard must be clearly and permanently labelled as having an inverter energy system connected to it. The circuit breaker, fuse or switch must also be clearly labelled;
- The installation of an Inverter Controlled Energy System is "prescribed work" and a copy of the Certificate of Electrical Safety and Electrical Work Request shall be provided to the Distributor;
- A test shall be carried out by the relevant Distributor's representative at the time the system is commissioned to ensure that "islanding" does not occur; and
- A label indicating that an alternative power supply system is connected to the electrical installation shall be fitted at the FOLCB for an overhead electricity supply or at the consumer terminals and service fuse for underground supply.

6.8.4.3 Metering

The meter shall be an electronic meter with import and export registers to accept periods of reverse power flow when power is flowing into the grid from the customer's premises. Refer to relevant Distributor for details.



Figure 6.1 Typical Alternative Supply Arrangements



Figure 6.2 Typical Installation of an Invertor Energy System Incorporating an Uninterruptible Power Supply

WARNING

DUAL SUPPLY

ISOLATE BOTH NORMAL AND INVERTER SUPPLIES BEFORE WORKING ON THIS DISTRIBUTION BOARD

Typical label to be installed at Main Switchboard or Distribution Board where the inverter energy system is connected. NORMAL SUPPLY MAIN SWITCH

INVERTER SUPPLY MAIN SWITCH

Typical labels to be installed adjacent to isolating switches at Main Switchboard or Distribution Board where the inverter energy system is connected

Figure 6.3 Typical Labelling Requirements

Section 7

Low Voltage Supply

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7.1 Services

7.1.1 General

The customer, at their expense, shall provide adequate mounting and installation facilities for the Distributor's service equipment in accordance with these Rules.

Service equipment supplied and installed by the Distributor shall remain the property of, and be maintained by the Distributor.

7.1.2 Type of Service

The type of service to be provided shall be determined in conjunction with clause 6.2 (Point of Supplies), where the relevant Distributor nominates the point of supply and consumer's terminals location.

Where the customer cannot provide and maintain facilities for an overhead service cable in accordance with clause 7.3 (Overhead Supplies), an underground service pit or service cable shall be required.

Where an underground service pit or service cable is not suitable, the customer may negotiate other supply arrangements, such as the installation of a substation on the customer's property, with the relevant Distributor.

The type of service provided must be in accordance with the Electricity Safety Act and Regulations and the bushfire risk classification of the area as determined by the Fire Control Authority in which the service cable is located. Unless otherwise determined in accordance with the above criteria, the type of service shall be provided in accordance with the bushfire risk classification of the area detailed in Table 7.1.

Existing Distributor Mains Reticulation	
Overhead	
overhead service cable will normally nstalled where the customer vides facilities in accordance with use 7.3.* underground supply may be vided at the customer's request.	
ingle span overhead service cable y be installed to a structure where the tomer provides facilities in ordance with clause 7.3.* underground supply may be vided at the customer's request.	
in y l to or ui vi	

 Table 7.1 Type of Service – Bush Fire Risk Areas

*An underground service pit or service line is required where facilities for an overhead servic cable are not or cannot be provided in accordance with clause 7.3 (Overhead Supplies).

Note that servicing and supply costs will be determined upon application in accordance with clause 5.4 (Application for Supply)

7.1.3 Connections to Services

The customer shall provide and maintain suitable means of termination for connection of the service cable and/or Distributor's mains and metering equipment to the consumer's mains.

Aluminium and hard drawn copper conductors are not suitable for termination directly onto Distributors service or metering equipment.

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Compacted and/or compressed stranded copper conductor having less than 18 strands shall not be terminated to a Distributor service or metering equipment.

There are also limits on the size of conductors to be connected into Distributors' equipment such as service pits and metering, eg:

- Clause 8.11.5 (Meter Wiring) specifies that only multi strand soft drawn copper conductors shall be provided for metering equipment and that where 25mm² or 35mm² conductors are used they shall be not less than 18 strands; and
- Clause 7.7.6.5 (Pit Connections) specifies that only copper consumer's mains no greater in size than 50 mm² or less than 6mm² and one set of 50 mm² consumer's mains shall enter or be connected in a service pit.

Where non-compliant conductors are installed they shall be converted to compliant conductors prior to being connected to the Distributors' equipment.

The relevant Distributor must be consulted where the suitability of proposed connection facilities is in doubt.

7.2 Underground Supplies

7.2.1 Consumer's Terminals

The consumer's terminals for an underground service cable shall be:

- located in a position nominated by the Distributor;
- adjacent to the service protection device where located within a supply connection facility;
- compatible to the Distributor's service cable; and
- where provided by the customer, the terminals shall be maintained by the customer in a condition that allows the distributor's service cable to be safely accessed, disconnected and reconnected.

Table 7.2 Typical Consumer's Terminal Locations

Supply Capacity	Consumer's Terminals		
≤ 100 A per phase	Within a pit adjacent to the property boundary; or		
	Within a supply connection facility located:		
	• at the property boundary; or		
	• at an agreed distance and location from the property boundary with approval of the Distributor.		
>100 A per phase	Within a pit adjacent to the property boundary where the Distributor agrees to the installation of a pit for an individual electrical installation not exceeding 170A supply capacity; or Within a supply connection facility located:		
	• at the property boundary; or		
	• at an agreed distance and location from the property boundary with approval of the Distributor.		

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7.2.2 Underground Services

7.2.2.1 General

In all cases the type and installation of, and connection to an underground service cable is subject to the agreement of the relevant Distributor.

Except in exceptional circumstances an underground service shall be provided where:

- The area is serviced by underground distribution mains;
- The Electricity Safety Act and Regulations require the consumer's mains to be placed underground in hazardous bushfire risk areas;
- The formal conditions under which supply is to be provided specify an underground service;
- The required clearances and facilities for an aerial service cable cannot be achieved and/or, maintained;
- The Determined Maximum Demand to be provided from the L.V. overhead distribution mains exceeds 170 A per phase; and
- Where the customer would normally be provided with an overhead service, but has requested, and the relevant Distributor has agreed to the installation of an underground service.

7.2.2.2 Provision of Consumer's Terminals

Except for consumer's terminals within a service pit or where agreed with the relevant Distributor, the customer shall provide the consumer's terminals and suitable facilities for the installation and termination of the nominated service cable.

7.2.2.3 Service Pits

Service pits are normally installed:

- adjacent dividing boundaries to provide supply to adjacent properties; or
- adjacent the boundary of a single property, ie, a dedicated service pit; or
- at the point of supply adjacent to or within public or private property.

Subject to the agreement of the relevant Distributor:

- the usual maximum supply that may be connected to a pit is 100Amp 3 phase; and
- in certain situations up to 170 Amp 3 phase supply may be available.

The relevant Distributor will normally supply and install the consumer's terminals within a service pit, ie, the consumer's mains/service connection device.

Refer to Clauses 7.7.5 (Terminations), 7.7.6.5 (Pit Connections) and Figure 7.8 for requirements for terminating consumer's mains into pits.

7.2.2.4 Underground Service Cable Termination

Where the Distributor agrees to install a service cable, the consumer's terminals shall be housed in a supply connection facility.

The customer shall provide facilities to the satisfaction of the relevant Distributor for the installation of the service cable/s into the supply connection facility, and connection of the service cables to the consumer's terminals by the Distributor. The Distributor shall provide and terminate each service cable conductor to a fixed M12 (bolt/stud) consumer's terminals provided by the customer.

Where the service cable originates from outside the property the location of the supply connection facility shall be located on the customer's property at the property boundary, or with the agreement of the relevant Distributor, the cable may extend into the property.

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Where a service cable originates from inside the property, the supply connection facility location shall be agreed with the relevant Distributor, and as close as practical to the supply source.

Suitable access and sufficient space shall be provided and maintained to enable installation and connection of the service cables and for access at all times subsequent to connection. Unless otherwise agreed with the Responsible Officer, a 1m space shall be provided around a supply connection facility where persons are to pass to enable all electrical equipment to be effectively installed, operated and maintained.

The connection facility shall be constructed and installed in a manner to provide protection from weather, vandals, vehicles and any other damage that can be reasonably expected.

Un-metered terminals and equipment shall be segregated from other equipment, and removable covers to provide access to un-metered terminals and equipment shall be provided with sealing facilities and/or equipped with a VPI lock in accordance with Clause 4.7, or a Distributor's lock if required by the relevant Distributor.

Table 7.3 and Figure 7.1 specify minimum requirements for supply connection facilities that are provided by the customer for the termination of Distributor's service cables.

SERVICE CABLE		SUPPLY CONNECTION FACILITY			
Service Cable Size	Minimum Conduit size for Service	Minimum clear space between service cable entry and consumer terminals		e between Minimum try and distance iinals between	
	cable (mm)	One or two faces of access	Three or four faces of access	centres of consumer terminals	
		(eg, CT enclosure with 1 door access)	(eg, pillar with lift off cover)		
		Dimension A		Dimension B	
		(m	m)	(mm)	
1 X 35mm ² Cu XLPE	63	260	260	75	
1 X 35mm ² Cu XLPE 1 X 50mm ² Cu XLPE	63 80	260 260	260 260	75 75	
1 X 35mm ² Cu XLPE 1 X 50mm ² Cu XLPE 1 X 185 mm ² Alum.	63 80 100*	260 260 500	260 260 360	75 75 100	
1 X 35mm ² Cu XLPE 1 X 50mm ² Cu XLPE 1 X 185 mm ² Alum. 1 X 240 mm ² Alum.	63 80 100* 100*	260 260 500 500	260 260 360 360	75 75 100 100	
1 X 35mm ² Cu XLPE 1 X 50mm ² Cu XLPE 1 X 185 mm ² Alum. 1 X 240 mm ² Alum. 2 X 50mm ² Cu XLPE	63 80 100* 100* 100	260 260 500 500 450	260 260 360 360 260	75 75 100 100 75	
1 X 35mm ² Cu XLPE 1 X 50mm ² Cu XLPE 1 X 185 mm ² Alum. 1 X 240 mm ² Alum. 2 X 50mm ² Cu XLPE 2 X 185 mm ² Alum.	63 80 100* 100* 100 2 x 100*	260 260 500 500 450 700	260 260 360 360 260 600	75 75 100 100 75 100	
1 X 35mm ² Cu XLPE 1 X 50mm ² Cu XLPE 1 X 185 mm ² Alum. 1 X 240 mm ² Alum. 2 X 50mm ² Cu XLPE 2 X 185 mm ² Alum. 2 X 240 mm ² Alum.	63 80 100* 100* 100 2 x 100* 2 x 100*	260 260 500 500 450 700 700	260 260 360 260 600 600	75 75 100 100 75 100 100	

Table 7.3 Service Cables – Supply Connection Facility Requirements



For Current Transformer Enclosures, refer also to Figure 8.28 and 8.30 for Minimum Current transformer Mounting Space.

Figure 7.1 UG Service Cables – Supply Connection Facility Requirements

7.3 Overhead Supplies

7.3.1 Scope

This Rule applies to aerial service cables by:

- all new connections; and
 - alterations initiated by the customer for:
 - replacement of mains from the consumer's terminals; and/or
 - relocation of the point of attachment; and/or
 - fault work due to a customer's electrical installations failure, actions or property that causes replacement of the un-metered portion of the consumer's mains or the relocation of the point of attachment; and/or
 - failure to achieve and maintain service cable clearance in accordance with these Rules.

7.3.2 General

In all cases, the type and installation of, and connection, replacement and relocation of an aerial service cable is subject to the agreement of the relevant Distributor.

Except in exceptional circumstances and where the relevant Distributor has agreed otherwise, an aerial service shall be provided and maintained by the Distributor where:

- The area is serviced by overhead distribution mains; and
- Supply is available to suit the load and;
 - a single phase load does not exceed 80 Amps;
 - a multiphase load supplied by a ≤35mm² service cable does not exceed 90 Amps per phase;
 - a multiphase load supplied by a 95mm² service cable does not exceed 170 Amps per phase;
- The total length of the service cable does not exceed 45m including a maximum of 20m over the customer's property;
- All clearances detailed in Figures 7.5, 7.6 and 7.7 can be achieved and maintained and all other provisions of this Rule are met; and
- The customer has provided facilities to meet the requirements of these Rules.

Where the customer would normally be provided with an overhead service in accordance with clause 7.1 (Services), but has requested, and the relevant Distributor has agreed to install an underground service, an underground service will be installed in accordance with clause 7.2 (Underground Supplies).

The relevant Distributor shall be contacted where any clarification is required. The supply shall be placed underground where the required clearances and all other provisions of these Rules can not be achieved or are not maintained.

7.3.3 Consumer'sTerminals

The consumer's terminals for an aerial service cable shall be:

- located in a position acceptable to the relevant Distributor;
- located within or adjacent to the service protection device enclosure;
- compatible to the distributor's service cable; and
- provided maintained by the customer in a condition that allows the distributor's service cable to be safely accessed, disconnected and reconnected.

Typical consumer terminal locations are detailed in Table 7.4. The relevant Distributor will determine the location and type of consumer's terminals in situations not covered by this table.
Supply Capacity	Consumer's Terminals		
≤ 80 A Single phase	 a) On Buildings, and private poles supporting meters and/or a main switchboard: Within an Fused Overhead Line Connection Box containing the service protection devices in an area suitable for a POA and ≤ 500mm from the POA. 		
≤ 100 A per phase	b) On private poles not supporting meters and/or a main switchboard:		
	• within a Fused Overhead Line Connection Box containing the service protection devices; or		
	• a Pole Circuit Breaker at 4m from ground level.		
>100 A ≤170 A per	Within a Fuse Service Disconnection device containing the		
phase	service protection devices in an area suitable for a POA and		
	\leq 500mm from the POA.		

Table 7.4 Typical Consumer's Terminals Locations

7.3.4 Point of Attachment (POA)

7.3.4.1 Definition

A Point of Attachment (POA) is the point where the service bracket to which an overhead aerial service cable is attached.

7.3.4.2 POA Access

The POA shall be safely accessible in accordance with the Occupational Health & Safety Prevention of Falls Regulations. To assist compliance with these Regulations: Provision of un-obstructed access to the POA, and acceptable facilities shall be provided and maintained so the service protection devices can be safely worked on and operated in accordance with clause 7.4.2.2 (Access), and the service cable can be installed and maintained safely:

- from an a vehicle mounted telescopic elevated work platform of a type that is able to traverse domestic driveways where practical; and
- in all cases from a person standing on a portable extension ladder located upon the ground except as provided for in clause 7.4.6.2.2 (Supply above Commercial Premises Verandas).

In all cases the POA shall be provided with minimum portable extension ladder access facilities in accordance with Figure 7.2 for set up of the ladder, ground conditions and acceptable support of the ladder head.



Figure 7.2 POA Minimum Portable Extension Ladder Access Facilities

7.3.4.3 POA Location

The POA of an aerial service cable to a customer's electrical installation:

- (a) Shall be selected in accordance with this clause and the details provided in Figures 7.2, 7.3, 7.5, 7.6 and 7.7.
- (b) Shall only be installed above verandas and roofs if agreed by the relevant Distributor.
- (c) Must be located to limit the length of service cable over the property to 20m.
- (d) Shall be selected where practical to avoid the necessity for the service cable to cross over roads, driveways, swimming pools, areas where vehicles may traverse, roofs, structures and adjacent properties.
- (e) Shall be located on the foremost portion of the structure facing the pole or point where the aerial service cable originates, and in a position where the service cable can achieve and maintain all clearances unless a more appropriate location is available.

The relevant Distributor shall be consulted where:

- There is a substantial electrical load;
- An electrical installation on a corner allotment has potential to be serviced from either street;
- The service may cross the boundary of an adjacent property;

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- A service from a urban pole type substation is proposed;
- A mid-span service is proposed;
- The customer proposes the Distributor install a service pole;
- There is a possibility of the pole being relocated;
- The POA is proposed to be located on other than the foremost portion of the structure facing the pole or point where the service cable originates;
- Vegetation may encroach on the proposed service cable clearance space;
- The service cable may pass over a roof or structure; and
- The required clearances and provisions of this section may not be achieved or maintained.

In all cases the POA must be located to achieve or exceed the minimum service cable clearances detailed in this clause and the Electricity Safety Act and Regulations are maintained, and a clearance of 0.6m from communications conductors is maintained at the POA and from the service cable.

Failure to consult the Distributor in the above cases and where clearances cannot be achieved or maintained may result in refusal to permit and/or maintain an overhead supply.

7.3.4.4 POA Suitability

The Electricity Safety Act and Regulations regulate requirements for poles and posts including supports, struts and extensions to structures used to support aerial conductors. All supports for service brackets used to support aerial conductors are required to comply with the Act and Regulations.

The POA, whether it be a structure, an extension or strut attached to a building or structure, or a private pole must be of sufficient strength to support the specified service bracket load applied by the service cable as detailed in clause 7.3.5.3.c) (Strength Rating).

7.3.4.5 POA on Buildings

The POA on buildings shall not be less than 3.0m or higher than 6m from the ground, and shall meet the minimum clearances detailed in Figure 7.3 and this clause.

The POA shall not be within areas accessible from the boundary of balconies measured 0.9m radially from such boundaries up to a height of 2.7. m above the surface normally accessible for pedestrian traffic or resort.

For opening windows and doorways:

- Where the top of window/door less than 2.7m above floor level the POA shall not be within an area 0.9m from bottom and sides of window/door and extending to 3.0m above floor level.
- Where the top of window/door greater than 2.7m above floor level and under 3.0m from floor level, POA shall not be within 0.9m from sides and bottom of window/door.
- Where the top of window/door greater than 2.7m above floor level and above 3.0m from floor level, POA shall not be within 0.3m from sides and top of window/door.

For non-opening windows, the POA shall not be located within 0.3m from the window.



Figure 7.3 POA on Buildings & POA on Private Poles

7.3.4.6 POA on Private Poles

The Electricity Safety Act and Regulations define the requirements for electrical installations. As a private pole forms part of an electrical installation, regulations applicable to electrical installations include the standard of construction and permitted locations for private poles, including builder supply poles.

Low Bushfire Risk Areas – A point of attachment on a private pole is acceptable in Low Bushfire Risk areas provided it meets all other conditions of these Rules.

High Bushfire Risk areas – The Electricity Safety Act and Regulations prohibit the use of a point of attachment on private poles in these areas for:

- new connections; and
- an existing private pole supporting an existing point of attachment is proposed to be replaced, and requirements of the Electricity Safety Act prevents its replacement.

In these circumstances, the relevant Distributor must be consulted to determine an appropriate supply method.

Where due to extenuating circumstances such as a major underground drain or channel obstructs an underground cable route, and where no other means of servicing is practicable, the customer may need to apply for an exemption to use a private pole from the Office of the Chief Electrical Inspector.

The POA on a private pole shall be located to achieve or exceed the required clearances and all other requirements of these Rules are met.

7.3.5 Service Brackets

7.3.5.1 General

All service brackets required by these Rules shall comply and be installed to comply with this specification and these Rules.

7.3.5.2 Provision

The customer shall provide, install and maintain a service bracket that complies with these Rules at the POA for the attachment of an aerial service cable.

7.3.5.3 Specification, Acceptance and Installation

Definitions

- (a) Service Bracket For the purpose of this specification there are two types of service brackets:
 - i) **Standard Service Bracket** A standard service bracket is defined as a bracket attached to a building or structure to provide a point of attachment for an overhead service cable at the point where the bracket is fixed, eg, house bracket, pole bracket and rafter bracket.
 - Service Raiser Bracket A service raiser bracket is defined as a type of service bracket attached to a building or structure to provide a higher point of attachment for an overhead service cable than would be otherwise conveniently available using a *standard* service bracket. A Service Raiser Bracket does not include a strut or extension of a building.

(b) Hook

The hook shall be a minimum of 10mm in diameter and constructed so as to retain a service cable terminator on the hook throughout an arc of 60^0 in all directions from the normal without the terminator interfering with access to connection boxes or removal of their covers. The hook must be able to accept closed hole and hook type service cable strain clamps.

(c) Strength Rating

Service bracket hooks shall have a minimum installed safe working load (SWL) of:

- 1kN for 2 wire service cables; and
- 2kN for multicore service cables $\leq 35 \text{ mm}^2$; and
- the value specified by the relevant Distributor for service cables >35 mm².

The hook strength rating must be met throughout an arc of 60^0 in all directions from the normal and all service brackets shall be of sufficient strength to withstand twice the hook's SWL without fracture or permanent deformation.

When installed in accordance with its installation instructions service brackets shall be of sufficient strength to withstand twice their safe working load without fracture or permanent deflection in excess of 3^0 .

(d) Marking

Service brackets that are required to be accepted shall be clearly and permanently marked with:

- Their strength rating (SWL); and
- Manufacturer identification and Catalogue Number

These markings shall be readily and clearly visible to a person adjacent to the bracket with the bracket in service.

(e) Corrosion Resistance

The corrosion resistance of all components of a service bracket shall be not less than that provided by galvanising in accordance with Australian Standard 4680 Hot Dipped Galvanised (Zinc) Coatings on Fabricated Ferrous Articles, Australian Standard 4791 Hot Dipped Galvanised (Zinc) Coatings on Open Section Ferrous Articles, Australian Standard 4792 Hot Dipped Galvanised (Zinc) Coatings on Hollow Section Ferrous Articles and Australian Standard 1214-1983 (Hot-Dip Galvanised Coatings for Threaded Fasteners – ISO Metric Coarse Thread Series).

(f) Prevention of Conductor Insulation Damage

There shall be no sharp edges and projections that the service or consumers mains cables may come in contact with whether on external or internal surfaces. The connection box mounting plate shall not protrude beyond the edge of the connection box.

The service bracket shall be constructed and installed in a manner to enable the service cable and equipment to maintain clearance from the connection box and bracket in situ, and for all connection box access covers to be removed without the necessity for the covers to contact the service cable or equipment.

(g) Provision for Earthing

Service *raiser* brackets shall be provided with a flag terminal with a hole sized to accept a M10 hot dipped galvanised bolt, washers and nut for connection of a earth bonding cable.

(h) Equipment Access

The service bracket and consumer's terminals and equipment shall be safely accessible in accordance with clause 7.3.4.2 (POA Access).

(i) Installation

Service *raiser* brackets that are required to be accepted shall be supplied with the manufacturer's recommended installation instructions. The instructions must include the SIR acceptance number and sufficient detail for the bracket to meet the strength and other requirements detailed in this specification when it is installed in accordance with the instructions.

The service *raiser* bracket shall be installed in accordance with the manufacturer's installation instructions.

Standard service brackets are to be installed in accordance with Figure 7.4 of these Rules or an equivalent standard.

(j) Acceptance of Service Brackets

- i) Standard service brackets and service raiser brackets that are not required to be accepted in accordance with Clause 4.4.1 shall meet the requirements of these Rules. The electrical contractor responsible for the electrical installation shall furnish proof, if requested to do so by the relevant Distributor, that a bracket meets the requirement of this specification.
- ii) Any service *raiser* bracket required to be accepted by Clause 4.4.1, must be accepted for use by the following type test process prior to installation:
 - Unless otherwise agreed, the documentation specified in Table 7.5 and a sample bracket shall be submitted to the nominated Rules Management Committee representative prior to the bracket's installation.
 - Provided the documentation and results are acceptable, the committee will provide a letter of acceptance for use, and that type service *raiser* bracket may be installed.

Failure to follow this process will usually result in the distributor's refusal to connect to the bracket.

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Documents		Certification		
S	b) Hook c) Strength Rating	By a suitably qualified engineer or party. (Strength rating may be by test or computation)		
B C L A	 d) Marking f) Prevention of conductor insulation damage g) Provision for Earthing i) Installation Instructions 	By a suitably qualified electrical approvals consultant or party.		
U S E	e) Corrosion Resistance	By the equipment galvaniser or other suitable party.		
	h) Equipment Access	By a suitably qualified Occupational Heath & Safety Practitioner or party.		
Engin mater	eering drawings detailing ials and dimensions	By the manufacturer or their representative.		
Photo the ins	s of strength rating marking and stalled bracket			
A man declar	nufacturers compliance ration			

Table 7.5 Service Raiser Bracket Acceptance Documentation





7.3.6 Aerial Service Cable Clearances

7.3.6.1 Existing Service Cables

The customer is responsible to ensure that modifications to the property they occupy do not breach the minimum clearances from ground, structures, objects, trees and vegetation to the service cable supplying the property they occupy required by the Rules and Regulations at the time of the service cable's installation and the current Electricity Safety Act (including the current Code of Practice for Electric Line Clearance (Vegetation)).

7.3.6.2 New and Replacement Service Cables

Unless advised otherwise by the relevant Distributor, clearances for an aerial service cable to:

- all new connections; and
- alterations initiated by the customer by:
 - replacement of mains from the consumer's terminals; and/or
 - relocation of the point of attachment; and
- fault work due to a customer's electrical installations failure, actions or property that causes replacement of the un-metered portion of the consumer's mains or the relocation of the point of attachment;

must comply with the requirements of the following:

- These Rules;
- Figure 7.5 Common Minimum Service Cable Clearances;
- Figure 7.6 Service Cable Sag;
- Figure 7.7 Service Cable Routes; and
- The Electricity Safety Act, including the current Code of Practice for Electric Line Clearance (Vegetation).

The customer is responsible to:

- Provide a point of attachment and arrangements on their property to ensure the clearances and conditions of these Rules and Electricity Safety Act and Regulations are achieved and maintained; and
- Ensure that modifications to the property they occupy do not breach the minimum clearances required by these Rules and Electricity Safety Act and Regulations from ground, structures, objects, trees and vegetation to the service cable supplying the property.

Clearances in excess of the minimum clearances specified by the Electricity Safety Act and Regulations will be required in situations not covered by Figure 7.5, eg, channels.

7.3.6.3 Achievement and Maintenance of Clearances

Where the customer is unable to provide facilities for the cable to meet and maintain the required clearances within their property in accordance with these Rules, the property shall be supplied by an underground service cable at the customer's cost.

A Distributor may agree to a customer's request to install a service pole or mid-span service or provide other works at the customer's expense to gain the required clearances within the customer's property for a new service cable, or where customer initiated works are taking place.

The Distributor will make arrangements with the customer for appropriate clearances to be met where a service cable is to be replaced in circumstances other than by works initiated by the customer.

If the customer fails to maintain clearances prescribed by Electricity Safety Regulations from trees or vegetation within their property to the aerial service cable supplying the property, the Distributor may clear those trees or vegetation in accordance with the Electricity Safety Act and Code of Practice for Electric Line Clearance (Vegetation) at the customer's expense.

The Distributor will provide for all clearances to be met outside the customers property, except for clearance of vegetation originating from council controlled land (roadways etc) in Declared Areas. In these cases the responsibility is that of the relevant municipal council.

The customer shall advise the Distributor where alterations to their point of attachment or property may in any way affect the clearances of an aerial service cable outside their property.

In all cases where clearances cannot be achieved and maintained, the property shall be supplied by means of an underground service cable at the customer's cost.



NOTES

Where a Distributor has an Electricity Safety Management Scheme the Clearances may vary from these specifications.

* These clearances are increased to 5000mm in Broad Acre Areas defined By Vic Roads. These areas are the municipalities of Mildura, Hindmarsh, West Wimmera, Horsham, Northern Grampians, Loddon, Gannawarra, Swan Hill, Buloke, and Yarriambiak.

** Refer to Melway's Street Directory and Vicroads Country Directory for public roadway definitions.

Figure 7.5 Common Minimum Service Cable Clearances

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7.3.7 Service Cable Sag

Service cables will sag after erection due to temperature rise and construction loadings.

Appropriate proportions of the "Sag On Erection" (normal sag) and the "In-service Sag Allowance" must be allowed for to ensure minimum clearances are met at all times.

Example: Span length $35m \text{ of } 4 \text{ x } 25mm^2$

Sag on Erection 1160mm + In-service Sag Allowance 360 mm = 1520mm

Where the termination points are level allow a minimum total service cable sag of 1520mm in the centre of the service cable below a straight line between the termination points.

The location and proportion of service cable sag will vary according to the angle of the termination points.

Cable Type	2, 3, x 25mm & 4 x 35mm (≤ 80) (≤ 95 Amp)		4 x 95mm (≤ 170 Amp)		
Span Length (m)	Sag On Erection* (mm)	In-service Sag Allowance** (mm)	Sag On Erection* (mm)	In-service Sag Allowance** (mm)	
10	150	230	130	230	
15	300	260	280	260	
20	510	290	500	270	
25	620	330	780	280	
30	870	350	1110	300	
35 1160 360		360	1510	300	
40 1500		370	1980	300	
45 1880 380 2500		310			
 * Sag on erection (ie, no electrical load) at assumed ambient of 15°C ** The in-service sag allowance is the sag at lowest point in span due to cable stretch, loaded temperature rise and pole movement. If point of consideration is at other than the lowest point then proportional allowance may be made. 					

Table 7.6 Service Cable Sag

Examples



Angled Services – Add proportions of "Sag On Erection & "In Service Sag" at lowest point and where appropriate along span length



Figure 7.6 Service Cable Sag

7.3.8 Service Cable Routes

A service cable over an adjacent property will only be permitted where it is unlikely to be subject to any risk of obstruction, and where the service cable will not encroach over more than 25% of the length of the front boundary or 2m of the side boundary of the adjacent property.

Where "Check with the Distributor" is indicated in Figure 7.7, the relevant Distributor must be contacted. Failure to do so may result in refusal to install an overhead service cable.



Figure 7.7 Service Cable Routes

7.4 Service Protection

7.4.1 Obligations

Customers are advised to install protective equipment to limit possible damage to their electrical installation or equipment which may be sensitive to voltage variation, transients, loss of one or more phases of supply or due to leakage current, eg, switchboard internal arcing fault. Refer to Clause 6.5 (Supply Loading) and the Electricity Distribution Code.

To satisfy the Electricity Distribution Code customers must control sustained overload, short circuits, phase loading, power factor, transient current, harmonic current, inrush current and other negative effects originating within the electrical installation to minimise adverse effects on other customers and the distribution system.

Compliance with this clause and clause 6.7 (Supply Capacity) will assist control of sustained overload, short circuits and phase loading arising from electrical installations, and limit adverse voltage fluctuations on other customers and the electricity distribution system. It is necessary to use measures other than those contained in these clauses to keep all other effects arising from an electrical installation within the required limits.

In addition, the Electricity Safety Act requires service lines to be protected by protective equipment that can isolate each of the active conductors of an electrical installation and prescribes their location.

The customer shall install and maintain "service protection device/s" in accordance with these Rules to comply with these requirements, and the obligations of the Distributor to connect and disconnect electrical installations.

7.4.2 Application of Service Protection Devices

7.4.2.1 General

Service protective device/s (SPD) that comply with Clause 7.4.5 (Service Protection Devices) shall be located and installed in accordance with the relevant requirements of the current Electricity Safety Act and Regulations, and these Rules.

The installed device shall:

- (a) minimise any adverse effects of short circuit or overload within the electrical installation on other customers and the distribution system;
- (b) enable each active conductor supplying the electrical installation to be isolated;
- (c) enable the Distributor to connect, disconnect and isolate each active conductor supplying the electrical installation for commercial and/or safety reasons; and
- (d) not exceed one device per phase.

A supply capacity control device may be used as a SPD provided it meets the requirements of clause 6.7.2.2 (Supply Capacity Control Devices), this clause and these Rules.

7.4.2.2 Access

Service Protection Device/s shall be installed in a position free of obstruction where access is continuously and readily available for the Distributor to safely operate and work on the device/s at all hours, unless otherwise agreed by the Distributor.

Access to Service Protection Devices fitted at the termination of an overhead service line, shall be arranged to permit safe and ready operation by means of a low voltage operating stick from ground level in accordance with clause 7.3.4.2 (POA Access), clause 7.3.4.3 (POA Location) and clause 7.4.6.2.2 (Supply above Commercial Premises Verandas).

Should access to service protection devices be impeded, arrangements shall be made for the restoration of unobstructed access at the customer's expense.

Delays may be experienced with connection or restoration of supply where access to service protection devices is impeded.

7.4.2.3 Selection of Device

Grading and selectivity between devices may be difficult to achieve in some situations. In such cases, a circuit breaker that can detect a downstream short-circuit and reset after the short-circuit is cleared by the downstream device may be of benefit to avoid unnecessary loss of supply to other circuits.

Where more than one phase of supply is provided, the service protection device may either be of a type which opens all phases or one that opens a single phase in the event of a single-phase fault.

Selection of the device should take into account customer requirements including potential consequences of loss of all phases of supply if the device selected is of a type to open all phases simultaneously, eg, public venue during an event.

Where the electrical installation is so arranged that a service protection device does not open all phases simultaneously upon operation, appropriate phase failure protection should be provided within the electrical installation for three phase motors and equipment.

7.4.2.4 Common Enclosures

The electrical wiring associated with Service Protection Devices installed in a common enclosure with other electrical installation control or protective equipment shall be segregated by barriers from that associated with such other equipment.

Provision shall be made to work on other electrical installation control or protective equipment without the need to disturb the Service Protective Device connections in any way.

Measures provided for locking off service protective devices shall be arranged to permit such locking without the need to disturb other electrical installation protective equipment.

7.4.3 Security

7.4.3.1 General

Service Protection Devices should be located and arranged to limit the ability of unauthorised persons to interfere with and/or operate the device/s.

An acceptable method to restrict unauthorised interference is to locate device/s other than those associated with an overhead service cable within an enclosure fitted with a VPI Lock in accordance with clause 4.7, except where a Distributor requires their lock to be fitted.

7.4.3.2 Distributor's Operation

Service Protection Devices shall be capable of being secured in the de-energised position by the Distributor.

Acceptable methods of security include the provision of facilities for fitting a Distributor's seal and/or lock in the de-energised position.

Fuses, other than those incorporated in an overhead line connector box, shall be provided with facilities to enable a Distributor's seal to seal the fuse cartridge carrier to its base at all times.

Circuit Breakers shall be provided with a permanently attached facility to enable the device to be locked in the de-energised position with a Distributor's padlock.

Where device/s are to be secured by means of a lock, the locking facility shall be capable of accepting an Distributor's padlock having a 5.5mm hasp.

The number of locks or seals required to secure or isolate any one customer's supply shall not exceed three.

Subject to the agreement of the Responsible Officer, other methods of security may be acceptable. Such other methods may include location of the device in an area restricted to authorised persons and locking with a VPI lock in accordance with clause 4.7.

Persons who interfere with the Distributor seals or locks or operate service protection devices other than in accordance with the conditions of these Rules may be subject to action, including legal action, at the discretion of the relevant Distributor.

7.4.3.3 Construction Sites

Supply conditions specified by the OCEI for electrical installations on construction sites require, in effect, that fuses mounted upon meter panels installed on construction sites be fitted with a lockable device acceptable to the OCEI to prevent electrical hazards due to unauthorised interference. This lock shall be a VPI lock in accordance with Clause 4.7.

7.4.4 Operation

7.4.4.1 General

Fuse cartridges, where required, shall be supplied and installed by the relevant Distributor unless otherwise specified in these Rules or agreed with the Responsible Officer.

Service Protection Devices shall only be operated by:

- (a) Persons authorised by the relevant distributor; or
- (b) Authorised emergency services personnel whilst carrying out their duties; or
- (c) A person authorised by the customer responsible for the electrical installation where the service protection device is a circuit breaker that is/are not sealed or locked off by the Distributor in the de-energised position; or
- (d) Persons eligible to do so under the VESI Code of Practice for Low Voltage Service Fuse Removal and Reinsertion by "Electrician" and "L" and "G" Inspector Licence Holders.

Persons who interfere with the Distributor's seals or locks or operate service protection devices other than in accordance with the conditions of these Rules may be subject to action, including legal action, at the discretion of the relevant Distributor.

7.4.4.2 Emergency Services Personnel

Emergency services personnel should only operate service protection devices if so authorised by their organisation.

Where the service protection device is operated by emergency service personnel, it should only be operated to de-energise the electrical installation and shall not be operated to energise or re-energise the electrical installation.

Where emergency services personnel de-energise an electrical installation by operation of a service protection device, the customer (occupant) and relevant Distributor must be advised at the earliest opportunity.

7.4.4.3 Licensed Electrical Workers

Persons eligible to operate service protection devices (low voltage fuses) under the VESI Code of Practice for Low Voltage Service Fuse Removal and Reinsertion by "Electrician" and "L" and "G" Inspector Licence Holders, must adhere to the conditions of that code.

7.4.5 Service Protection Devices

7.4.5.1 Circuit Breakers and Fuses – General Requirements

Service Protection Devices shall:-

- (a) be of a type acceptable to the Service and Installation Rules Management Committee or the relevant Distributor;
- (b) conform to the requirements of the appropriate Australian or International Standard for the type of device employed;
- (c) be installed in accordance with the requirements of the Electricity Safety Act and with these Rules;

- (d) be selected with regard to the following conditions, taking account of the nature of the supply (i.e. overhead, underground):
 - i) operating environment;
 - ii) enclosure of live parts;
 - iii) short-circuit interrupting capacity;
 - iv) ability to be manually operated, either directly by hand or by means of a standard low voltage operating stick from ground level;
 - v) facilities for sealing or locking by the Distributor as required by these Rules;
 - vi) termination compatibility with service conductors; and
 - vii) provision of separate terminals for connection of service neutral conductor and the consumers neutral conductor in an approved manner.
- (e) have a rated short circuit current capacity equal to or greater than the prospective short circuit current at the point it is installed, and in any case be not less than:
 - 6kA for single phase supplies; and
 - 10kA for multi-phase supplies.
- (f) ensure selectivity, with the upstream (Distributor's) and downstream (Customer's) protective devices;
- (g) have, or be installed with, facilities for sealing un-metered connections to prevent unauthorised access;
- (h) where appropriate, incorporate a facility to enable maintenance in accordance with the manufacturers specifications; and
- (i) be maintained by the customer in accordance with the manufacturers specifications.

7.4.5.2 Circuit Breakers – Particular Requirements

A circuit breaker may be used as a service protection device in lieu of a fuse specified in these Rules, provided that relevant requirements of these Rules are satisfied.

Where a circuit breaker is used as a service protection device, the circuit breaker shall, in addition to the requirements of Clause 7.4.5.1 (Circuit Breakers and Fuses – General Requirements):

- (a) have, or be installed with, a facility for preventing the handle to be operated when in the 'off' position by a padlock having a 5.5mm diameter hasp;
- (b) have access to any adjustable settings capable of being restricted to authorised persons by sealing or equivalent means.;
- (c) have all live terminals and connections enclosed;
- (d) may have an auto-reclosing facility that limits current and provides selectivity with downstream protective devices during a short circuit:
- (e) If installed as a combined Supply Protection/Supply Capacity device the circuit breaker shall operate:
 - so as not to exceed the allocated supply capacity if installed to control supply capacity in accordance with clause 6.7.1.1; and
 - so as not to exceed 130% of the allocated supply capacity for more than 2 hours if installed to control supply capacity in accordance with clause 6.7.1.2.

7.4.5.3 Devices up to and including 125A rating

7.4.5.3.1 Circuit Breakers

Circuit Breakers used as service protection devices for loads up to 125 Amps, in addition to complying with clauses 7.4.5.1 (Circuit Breakers and Fuses – General Requirements) and 7.4.5.2 (Circuit Breakers – Particular Requirements) shall:

- comply with AS/NZS 3947.2:2002, AS/NZS 4898:1997 and/or AS 3111 as appropriate; and
- have an instantaneous tripping characteristic in excess of 10xIn ('D' Curve)

(a) Miniature Circuit Breakers

Miniature Circuit Breakers shall comply with AS/NZS 4898:1997 or AS 3111:1994

(b) Pole Mounted Circuit Breakers

Pole mounted circuit breakers shall comply with:

- AS/NZS 3124:2002 or a recognised equivalent standard; or
- AS/NZS 4898:1997 and the appropriate requirements of AS/NZS 3124

Pole mounted circuit breakers shall be provided with:

- consumer's terminals;
- a means of operating the device by means of a low voltage fuse stick from ground level;
- sealing facilities to prevent access to consumer's terminals and to prevent operation of the device when it is locked off; and
- locking off facilities to accept a lock with a 5.5mm diameter hasp.

7.4.5.3.2 Fuses

(a) General

Fuses rated at up to 100A shall be capable of accepting 22mm barrel fuse cartridges of Type 2a, to AS/NZS 60269.2.1:2001, or a recognised equivalent Standard, supplied by the Distributor.

Miniature Combined Fuse Switches provided by the customer shall be supplied with enclosed fuse cartridges to AS/NZS 60269.3.1:2002.

(b) Fused Overhead Line Connector Boxes

Fused overhead line connector boxes shall comply with AS/NZS 3124:2002.

Fused overhead line connector boxes shall provide for manual operation by means of a low voltage operating stick from ground level and the cover shall be provided with sealing facilities.

(c) Panel Mounted Fuses

Panel mounted fuse base and carrier's shall be of a minimum continuous rating of 100 Amp, 500 Volt rating with a hand operated fuse carrier; and

- comply to AS/NZS 60269.2.1:2001;
- have all live parts shrouded;
- be capable of being sealed using facilities cast into the base and carrier when the fuse carrier is inserted; and
- be back connected Studs or front wired types are not acceptable.

Spacing, ventilation and de-rating of panel mounted fuses should be considered where subject to loads exceeding 80 Amperes.

(d) Stick Operated, Panel Mounted Fuses

Stick Operated, Panel Mounted Fuses are a specific form of panel mounted fuse originally designed for mounting on a connection box mounted on the underside of a shop veranda.

These fuses are no longer acceptable for use as a service protection device or supply disconnection device for new connections, and alterations or additions to existing electrical installations.

(e) Miniature Combined Fuse Switches

Miniature Combined Fuse Switches shall comply with AS 3947 and shall accommodate fuse cartridges to AS/NZS 60269.3.1:2002, or a recognised equivalent Standard, supplied by the customer.

7.4.5.4 Devices above 125A rating

7.4.5.4.1 Circuit Breakers

Circuit Breakers used as service protection devices for loads above 125Amps, in addition to complying with clauses 7.4.5.1 (Circuit Breakers and Fuses – General Requirements) and 7.4.5.2 (Circuit Breakers – Particular Requirements) shall:

- comply to AS/NZS 3947.2:2002; and
- have an instantaneous tripping characteristic in excess of 10xIn

7.4.5.4.2 Fuses

(a) General

Fuses rated in excess of 100A shall be suitable for use with either blade or bolted fuse cartridges to AS/NZS 60269.2.1:2001, or a recognised equivalent Standard. Fuse cartridges shall be supplied by the Distributor.

(b) Fused Switch Disconnector (FSD)

Fused Switch Disconnectors shall comply with AS 3947.3 and may be single or multiphase devices which accept blade type fuse cartridges.

FSDs shall be suitable for mounting on either a pole or building facade and be capable of manual operation by means of a low voltage operating stick from ground level.

Where mounted on a customer's structure FSD's must be so arranged that access to active parts (removal of cover) can only be gained with the use of a tool.

(c) Combined Fuse Switches (CFS)

Combined Fuse Switches shall comply with AS 3947.3 and shall accommodate either blade or bolted fuse cartridges.

(d) LV Fused Isolator (Hinged Fuse Switch)

LV Fused Isolators (Hinged Fuse Switches) are designed as line fuses for the low voltage distribution system and are normally supplied and installed by the Distributor.

Subject to the approval of the Responsible Officer and the agreement of the customer to meet the costs involved, such fuses may also be employed as a service protection device where it is not practical to provide an alternative arrangement.

7.4.6 Acceptable Applications

7.4.6.1 Underground Supply

This clause covers the service protection requirements where supply is provided from an Underground Service Cable or Service Pit.

Service protection devices shall be installed in a position free of obstruction and where access is readily available for:

i) manual operation of the device/s from ground or floor level; and

ii) safe work on the device/s.

Unless otherwise agreed with or required by the relevant Distributor, service protection device/s shall be located:

- within the supply connection facility; or
- at or within 3m of the consumer's terminals; or
- on the meter panel for direct metered electrical installations where the maximum demand of the electrical installation is ≤ 100 amps and the consumer mains install in accordance with the Electricity Act and Regulations; or
- where a service cable terminates within the main switchboard. In this instance the service protection device/s may also serve as main switch/es; and
- where an overhead line is replaced by an UG service cable and/or consumer's mains, in addition to the options listed above, at the point where the OH line was connected.

Table 7.6 Guide to Selection of Service Protection Devices – Underground Services

Underground Supply from/to	Current Rating per phase	Location	Device/s
Service pit	≤ 20A	Un-metered Switchboard or Meter Panel	Miniature CB or Miniature combined fuse switches
to		Meter Panel	Panel Mounted Fuse/s
consumer's mains and electrical installation	≤ 100A	Un-metered switchboard	Miniature CB
		A point where an overhead line was connected	FOLCB
		Within 3m of consumer's terminals supplying UG mains	Miniature CB, Miniature Combined Fuse Switches or Panel Mounted Fuse/s
	> 100A	Supply Connection Facility	CB, Fused Switch Disconnector or Combined Fuse Switch
Service Cable to a	<u>≤</u> 20A	Supply Connection Facility	Miniature CB or Miniature combined fuse switches
Supply Connection Facility	≤ 100A	Supply Connection Facility or Meter Panel	Miniature CB, Miniature combined fuse switches or Panel Mounted Fuse/s
	> 100A	Supply Connection Facility	CB, Fused Switch Disconnector or Combined Fuse Switch
	<u>≤</u> 100A	Where the overhead line was connected	FOLCB

7.4.6.2 Overhead Supply

7.4.6.2.1 General

This clause covers supply from an overhead aerial service cable and façade mounted servicing systems.

Service protection devices shall be installed in a position free of obstruction and where access is readily available for:

i) manual operation of device/s from ground level with a low voltage operating stick unless otherwise agreed with the relevant Distributor in accordance with clause 7.4.6.2.2 (Supply Above Commercial Premises Verandas); and

ii) safe access to work on the device/s in accordance with clause 7.3.4.2 (POA Access).

Unless otherwise agreed with, or required by the relevant Distributor service protection device/s shall be located:

- a) within 0.5m of the point of attachment, no higher than 6m and no lower than 3.0m and not within areas precluded for a POA on buildings detailed in clause 7.3.4.5 (POA on Buildings) and Figure 7.3 (POA on Buildings & POA on Private Poles); or
- b) adjacent the consumer's terminals within the pole circuit breaker on private poles; or
- c) *on the Distributor's pole where:
 - the Responsible Officer agrees to install the service protection device at the origin of the service line; and
 - the electrical installation's demand exceeds 100A per phase; and
 - the customer agrees to meet all additional costs involved; and
 - the consumers mains terminates at a suitable terminating device adjacent to the point of attachment of the service line; and
 - a supply disconnection device is installed in accordance with the relevant Distributor's requirements.
- * Not all Distributors offer this option

7.4.6.2.2 Supply above Commercial Premises Verandas

Where in accordance with clause 7.3.4.3 (POA Location) it is not practical to provide an alternate POA and the relevant Distributor agrees to supply an overhead service cable to a POA above a commercial premises veranda the following conditions apply:

- Safe access to the POA, consumer's terminals and service protection device/s shall be provided to the relevant Distributor's satisfaction;
- Provision shall be made for sealing to facilitate restriction to un-metered terminals in accordance with clause 7.4.5.1(g) (Circuit Breakers and Fuses General Requirements);
- Stick operated fuses must be able to be operated with a 600mm long head section of a standard low voltage fuse stick; and
- In addition to the service protection device/s adjacent the POA supply disconnection device/s (SDD) are to be installed in accordance with clause 7.5 (Supply Disconnection Devices)

7.4.6.2.3 Supply to Private Poles

Where the service protection device is fitted to a private overhead electric line, the Electricity Safety Act and Regulations effectively requires a circuit breaker to be fitted.

Where a circuit breaker is fitted it shall be a pole type circuit breaker in accordance with 7.4.5.3.1(b) (Pole Mounted Circuit Breakers) and located at 4m from ground level in accordance with clause 7.8.1.2 (Protection).

A pole circuit breaker may also serve as the service protection device and consumer's terminals for a private underground electric line when located upon a private pole.

Overhead Service Supply	Current Rating per phase	Location	Device/s	
To a Dwilding on	<u>≤</u> 100A	Within 500mm of POA	FOLCB	
structure	100 <u>≤</u> 170A	within 500mm of POA	FSD	
	<u><</u> 100A		CB to POEL	
To a Private Pole	vate Pole Circuit Breaker - 4m from ground level on first private pole		from ground first priva	CB or FOLCB to underground consumer mains
	$100 \le 170 \mathrm{A}$	Fuses – within 500mm of POA	CB to POEL	
			CB or FSD to	
			underground consumer	
			mains	

Table 7.7 Guide to Selection of Service Protection Devices- Overhead Services

7.4.6.3 Supply from Distributor's Pole

This clause covers supply:

- to an electrical installation located upon a distributor's pole; and
- consumer's mains that connect to consumer's terminals located upon the pole.

Service protection devices shall be installed in a position free of obstruction and where access is readily available for safe work on and operation of the device/s in accordance with clause 7.3.4.2 (POA Access).

Unless otherwise agreed with, or required by the relevant Distributor service protection device/s shall be located at 4m above ground level.

Where the service protection device is fitted to a private overhead electric line, the Electricity Safety Act effectively requires a circuit breaker to be fitted.

A pole circuit breaker may also serve as the service protection device and consumer's terminals for a private underground electric line when installed upon a Distributor's pole located in private property.

A Circuit Breaker used as a Service Protection Device may be housed in a suitably IP rated, UV stabilized enclosure installed on the pole.

The service protection device shall be located with the consumer's terminals at 4m from ground level in accordance with clause 7.8.5 (Equipment Installed on Distributor's Pole) and the work shall be performed in accordance with the safety conditions for working on poles detailed in Clause 7.6.4 (Poles & Overhead Lines).

Supply from Distributor's pole	Current Rating per phase	Location	Device/s	
To an un-metered main switchboard on pole; or	≤ 20A	4m from ground on pole	Miniature CB or Miniature combined	
To underground consumer's mains supplying an un-metered electrical installation			fuse switches	
To underground consumer's mains	<u><</u> 100A	4m from ground on pole	FOLCB or pole circuit breaker - if pole is on customers property	
	>100A <u><</u> 600A		FSD	
	>600A	As agreed with re	As agreed with relevant Distributor	
To POEL	All	4m from ground on pole	Pole circuit breaker	

Table 7.8 Guide to Selection of Service Protection Devices - Supply Direct from Distributor's Pole

7.4.6.4 Supply Direct from an Indoor, Kiosk or Ground Type Substation

This clause covers service protection device requirements for supply from an Indoor, Kiosk or Ground Type substation.

Service protection devices shall be installed in a position free of obstruction and where access is readily available for:

- i) manual operation of the device/s from ground or floor level; and
- ii) safe work on the device/s

Unless otherwise agreed with, or required by the relevant Distributor service protection device/s shall be located within a supply connection facility on the customer's property and outside the substation enclosure as close as reasonably practicable to the low voltage terminals of the substation.

One or more of the following options may be available from some Distributor's.

The Responsible Officer may agree:

- to the provision of a suitable protective device within the Distributor's substation.
- that the service protective device be installed remote from the substation and in certain situations the electrical installation main switch may be regarded as the protection required by this Clause.
- that no low voltage service protection device need be installed, where the supply transformer is located on the premises and the supply arrangements are such that low voltage fault current can be detected and cleared by the high voltage protection.

Table 7.9 Guide to Selection of Service Protection Devices- Supply Direct from Enclosed Substation

Supply from Enclosed Substation	Current Rating per phase	Location	Device/s
To a supply connection facility	<u>≤</u> 100A	On meter panel	Panel Mounted Fuse/s or CB
	> 100A	Adjacent to Substation	CB, FSD or CFS

7.5 Supply Disconnection Devices

Supply Disconnection Devices (SDD) are devices for disconnection and reconnection of occupancies in accordance with:

- (a) clause 7.4.6.2.2 (Supply above Commercial Premises Verandas); and
- (b) clause 7.8.3.4 b) (Multiple Occupancies Supply Disconnection Devices); eg:
 - direct metering as required by clause 8.11.4.2 b) (Individual occupancy metering isolation);
 - current transformer (CT) metering required by clause 8.12.4.2 (CT Isolation Multiple Occupancy).

Unless otherwise agreed by the relevant Distributor:

- i) The SDD for direct metered occupancies shall be a meter panel mounted fuse that complies with clause 7.4.5.3.2 (c) (Panel Mounted Fuses) located adjacent to each occupancy meter. The relevant Distributor will supply and install the fuse cartridge.
- ii) The SDD for CT metered occupancies and isolation required shall be:
 - located in a position that can be readily and safely accessed by the relevant Distributors representative at all times;
 - capable of isolating the conductor's that pass through the CTs;
 - capable of being locked in the off position, and/or located in a position with a facility for the SDD enclosure to be locked with a padlock with a 5.5mm diameter hasp; and
 - adjacent to the meters, or have a permanent and legible diagram installed at the meter position which accurately shows its location and access arrangement.

Any SDD supplying essential services shall be equipped with a "Warning" label to indicate the portion/s of the electrical installation it controls.

7.6 Safety when working on or near Network Assets

7.6.1 No Go Zone

The Office of the Chief Electrical Inspector (OCEI) and the Victorian Workcover Authority (VWA) requires all workers to comply with the "No Go Zone" Guidelines and Framework administered by those authorities. Additional information to that provided below may be referenced from the OCEI and VWA websites detailed in the "references" section of these Rules.

The framework sets out the requirements for the safe conduct of work near overhead and underground utility assets, including electricity network assets. In particular it sets out the framework for the safe conduct of work near overhead lines, including the use of mobile plant, and the conduct of works involving excavations near underground cables and earthing systems.

It also specifies the safe limits of approach for workers engaged in these works and the need for obtaining the permission of the relevant Distributor when working near overhead and underground electricity network assets.

Customers and their agents must consider these requirements when planning any works near Distributor's assets and employ a safe system of work.

Where the No Go Zone rules stipulate, the relevant Distributor must be contacted for permission and conditions to perform the work.

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7.6.2 Underground Cables

Any works carried out by a customer or a customer's agent in the vicinity of underground cables shall be carried out in accordance with clause 7.6.1 (No Go Zone)

Customers and their agents must contact "Dial Before You Dig" (Telephone 1100) to obtain information on the location of any existing underground assets before any works involving excavations are commenced.

7.6.3 Substations

Under no circumstances shall a customer or a customer's agent enter a substation enclosure or climb a pole without first contacting the relevant Distributor and obtaining approval and permission to enter the substation and/or carry out the proposed works. This shall be done in accordance with clause 7.6.1 (No Go Zone) and the conditions prescribed by the relevant Distributor.

Where cables are to be installed on or in a Distributor's substation, no excavation work within 10m of the substation shall commence before the route of the cable has been approved by, and advice regarding the substation earthing system obtained from, the Responsible Officer.

In the case of a "Single Wire Earth Return" (SWER) substation, arrangements SHALL be made with the relevant Distributor to de-energise the substation prior to, and during trenching operations.

Where free standing switchboards and support structures are proposed to be installed within the vicinity of a high voltage earthing system associated with a substation the relevant Distributor shall be contacted to determine conditions related to its installation.

Note that damage to a high voltage-earthing conductor can cause an extremely hazardous situation.

7.6.4 Poles and Overhead Lines

Any works carried out by a customer or a customer's agent in the vicinity of overhead lines or poles shall be carried out in accordance clause 7.6.1 (No Go Zone).

Where free standing switchboards and support structures are proposed to be installed within the vicinity of a high voltage earthing system associated with a pole the relevant Distributor shall be contacted to determine conditions related to its installation.

All persons and apparatus shall maintain safe working clearances in accordance with the "No Go Zone" requirements. If this clearance cannot be maintained, the relevant Distributor shall be consulted before proceeding so that alternate arrangements can be made.

Except for reinstated poles, eg, staked, any pole marked with a large 'X' cut into or marked on the surface has a limited life and must therefore be considered unsafe to climb or support a ladder.

7.6.5 Service Pits

Any cables within a service pit shall be treated as ALIVE and shall not be handled without taking appropriate safety precautions.

7.6.6 Proximity of Electrical Installation and Distributor Assets

The Electricity Safety Act and Regulations should be referenced for regulations pertaining to work in the vicinity of Distributors assets.

To ensure safety is maintained, clauses 7.6.3 (Substations) and 7.6.4 (Poles and Overhead Lines) place restrictions on the location of free standing switchboards and support structures in the vicinity of substation high voltage systems.

The relevant Distributor should be contacted in all other circumstances where it is proposed to work, place structures or install sections of an electrical installation's wiring or equipment in the vicinity of network assets where not detailed in these Rules.

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7.6.7 Supply Isolation

The relevant Distributor shall be contacted at the earliest opportunity to isolate supply where required to enable work to be performed safely.

Circumstances where the Distributor must isolate supply is where the customer's agent cannot isolate supply by operation of the electrical installation's facilities such as main or isolation switches, or operate the service protection device/s in accordance with clause 7.4.4. (Operation)

Supply isolation procedures, systems and costs will vary between Distributors, and contact with the relevant Distributor listed in Section 3 should be made to determine these conditions.

7.7 Consumer's Mains

7.7.1 General

All electrical wiring work associated with the installation and maintenance of Consumer's Mains shall be carried out in accordance with the Electricity Safety Act and Regulations and these Rules.

Un-metered sub-mains and sub-circuits shall be considered as consumer's mains for the purposes of these Rules.

In accordance with Clause 6.3 (Consumer's terminals), the Distributor reserves the right to determine the location of the Consumer's Terminals, and the method for termination of consumer's mains where they are not specified by these Rules.

The type of consumer's mains connected to Distributors equipment must conform to clause 7.1.3 (Connection to Services).

7.7.2 Size of Consumer's Mains

The size of consumer's mains should be selected with consideration to the requirements of the Electricity Safety Act and Regulations and these Rules.

These Rules require that no conductor forming any portion of consumer's mains shall have a cross sectional area of less than 4.0mm², and clause 7.7.6.5 (Pit Connections) requires a minimum size of 6mm² for cables terminated into a service pit.

7.7.3 Identification of Consumer's Mains

All conductors at consumer's terminals and metering facilities shall be colour coded to clearly and permanently identify each incoming active conductor and the neutral conductor.

Identification of cables and cable conductor shall be by Heat Shrink sleeving, Fixed sleeving or Elastic sleeving in accordance with the Wiring Rules. Insulation tape is not an acceptable means of identification.

Neutral Identification: In all cases the neutral conductor shall be colour coded black.

Phase Identification: In the case of polyphase supplies, the active conductors shall be clearly and permanently identified to indicate each phase, i.e. red, white, blue.

SDI Cable Identification: Sleeving shall be applied to the sheath of SDI cables, eg, pits and meter panels. The sleeving shall be coloured to indicate the phasing of each conductor and the neutral conductor as detailed above.

Conductor Identification: Where the conductor of an insulated and sheathed cable is to be changed in polarity, e.g. active conductor to be used as a neutral, the cable conductor insulation shall be sleeved with black sleeving over the conductor insulation.

7.7.4 Joints in Un-metered Consumer's mains

Joints in un-metered consumer's mains shall be made in such a manner as to deter unauthorised access, interference or diversion of electricity supply in accordance with Table 7.10 and to the satisfaction of the relevant Distributor.

Joint Location		Acceptable jointing methods		
Not readily accessible or visible, eg:	Roof spaceIn WallUnderfloor	1.Joint enclosed in a suitable junction box filled with a hard setting, non conductive compound 2.Crimp link joints enclosed with heavy wall mastic filled heat shrinkable tubing fitted over joints and original conductor insulation with a second layer fitted where double insulation is required.		
Visible and readily accessible position, eg:	Adjacent the meter positionOn a pole or wall	 Joint enclosed in a suitable junction box with provision to fit a distributors seal. Crimp link joints enclosed with heavy wall mastic filled heat shrinkable tubing fitted over joints and original conductor insulation with a second layer fitted where double insulation is required 		
Behind a hinged meter panel	Meter panel with provision	feter panel with provision to fit a distributors seal		
Underground	 Joint enclosed in a su filled with a non con Crimp link joints enc shrinkable tubing fit insulation with a secu is required. 	Joint enclosed in a suitable junction box or similar enclosure filled with a non conductive, non hydroscopic compound Crimp link joints enclosed with heavy wall mastic filled heat shrinkable tubing fitted over joints and original conductor insulation with a second layer fitted where double insulation is required.		

Table 7.10 Joints in Un-metered Consumer's mains

7.7.5 Terminations

Terminations of consumer's mains shall be in accordance with the Electricity Safety Act and Regulations and these Rules.

Where termination methods are not specified in these Rules, the Responsible Officer shall be consulted to determine acceptable arrangements.

7.7.6 Underground Consumer's mains

7.7.6.1 Backfilling

The Electricity Safety Act and Regulations require that trenches containing underground consumer's mains be backfilled with a minimum of 500mm above the mains before they are energised.

Where a trench containing underground consumer's mains is not backfilled with a minimum of 500mm of cover the relevant Distributor shall refuse to connect supply.

7.7.6.2 Minimum Insulation Resistance

The insulation resistance between conductors and between conductors and earth or metallic sheath of un-metered underground consumer's mains shall not be not less than the following values when tested using a 500 V D.C. insulation resistance tester:

- For cables up to 50 m route length -50 megohms.
- For cables in excess of 50 m route length, a reduction of 5 megohms for each additional 25 m route length is acceptable subject to an absolute minimum of 5 megohms being obtained.

7.7.6.3 Wiring Systems

Un-metered underground consumer's mains shall be installed in accordance with the Electricity Safety Act and Regulations and in a manner that in the event of accidental damage being sustained, the likelihood of a short circuit between conductors or earth will operate electrical protection where this is fitted and minimise damage. To assist in achieving this result the following applies:

- The route of Underground Consumer's Mains shall, to the extent which is practicable, be selected so as to avoid substation earthing systems;
- Where installed in a metallic pipe or conduit all conductors shall be contained within the one pipe or conduit;
- Where installed in a non-metallic conduit or pipe all conductors shall be contained within the one pipe or conduit, except as provided below:
 - Not less than two conductors of different phase or polarity are contained within the one conduit and the conduits follow substantially the same route; or
 - Where single conductors are installed in individual conduits, the conduits should be securely lashed together to form a bundle;
- Unsheathed Thermoplastic Insulated (single insulated) cables should not be used for un-metered underground consumers mains;
- Precautions shall be taken to arrange underground enclosures to avoid moisture entering the building via the enclosure; particularly where a pit is installed at a higher level than the entry to the building; Conduit sealing and conduit drains are shown in Figure 7.8.
- The consumer's mains should be laid below other services and the trench partially backfilled prior to installing other services; and
- The requirements of other authorities for use of a common trench including clearances and minimum depth are to be met.

7.7.6.4 Wiring Systems in Underground Reticulated Distribution Areas

The Electricity Safety Act and Regulations require that each conductor of consumer's mains connected to a URD system of supply and entering a conductive enclosure be double insulated to the terminal of the first protective device/s and neutral termination.

TYPE OF CONSUMER'S MAINS CABLE	MINIMUM COVER ABOVE CABLE PROTECTION / ENCLOSURE		
	Heavy Duty Non-Metallic Conduit to AS 2053	Medium or Heavy Galvanised Steel Tube to AS 1074	Buried Direct using Approved Cover Slabs
Single Core cable, stranded copper conductor with elastomer, thermoplastic or xlpe insulation and sheathing, complying with AS 3116, AS 3147 or AS 3198 for underground cable.	0.5 m	0.5 m	Not Permitted
Multi-Core cable, stranded copper conductor with elastomer, thermoplastic or xlpe insulation and sheathing, complying with AS 3116, AS 3147 or AS 3198 for underground cable.	0.5 m	0.5 m	0.5 m
Neutral Screened Cable, stranded copper conductor, complying with AS 3155 for underground cables.	0.5 m	0.5 m	0.5 m

Table 7.11 Wiring Systems:Underground Reticulated Distribution Areas

7.7.6.5 Pit Connections

Consumer's mains to be terminated in service pits shall be prepared and installed by the customer's agent in accordance with this clause, Figure 7.8 and clause 7.7.3 (Identification of Consumer's Mains).

Any cables and equipment within a service pit shall be treated as ALIVE and shall not be handled without taking appropriate safety precautions.

Conduits shall extend a maximum of 100mm into the pit.

Only copper consumer's mains no greater in size than 50 mm² or less than 6mm² shall enter or be connected in a service pit. Conductor's ≥ 16 mm² shall have a minimum of 7 strands, and ≤ 16 mm² shall have a minimum of 18 strands. The maximum numbers of consumer's mains conductors that may be connected within a pit are as follows:

- dedicated pit one set of 50 mm² consumer's mains
- shared pit -2 sets ≤ 35 mm² consumer's mains

Consumer's Mains within the pit shall be double insulated:

- single-core insulated and sheathed stranded conductor; or
- single insulated rated individual cores of multi-core cable shall be suitably sheathed and identified with insulating material in accordance with clause 7.7.3 (Identification of Consumer's Mains) and Figure 7.8.
- Where a neutral screened cable is used, the cable shall be converted to commercially available single double insulated conductors external to the pit.

The cables shall extend to a minimum of 1.0m above the top of the pit, and cable end/s shall be sealed to prevent the ingress of moisture.

The cables for each electrical installation shall be tied together, identified with a permanent water resistant tag at or below ground level and left neatly coiled within the pit. The tag shall be permanently marked specifying the lot or street number of the premises it supplies.

Where the Distributor's pit connectors have been disturbed during the consumer's mains installation, the connectors shall be arranged to ensure the connectors are placed at the top of the pit with the connection ports facing the bottom of the pit.

The lid of the pit shall be replaced.



Figure 7.8 Requirements for Consumer Mains Supplied from a Service Pit

7.7.6.6 Termination on Distributor Pole

7.7.6.6.1 Work Practices

Termination of consumer's mains on a Distributor's pole must be carried out in accordance with clause 7.6 (Safety when Working on or near Network Assets) and all applicable industry requirements. These include but are not limited to the following:

- No Go Zone guidelines
- Electricity Safety Act and Regulations
- OH&S Act 1985 Working at Heights Regulations
- Clause 7.6 and 7.8.5 (Equipment Installed on Distributors Pole) of these Rules
- Code for the Shared Use of Poles

Except for reinstated poles, eg, staked, any pole marked with a large 'X' cut into or marked on the surface has a limited life and must therefore be considered unsafe to climb or support a ladder.

7.7.6.6.2 Installation

The customer is responsible for the installation of the cables and equipment to a height of 4 metres above ground level. The relevant Distributor shall be responsible to perform any works above 4m.

Cables and equipment shall be placed in a position such that they are least liable to mechanical damage and shall not obscure a Distributor pole identification mark or number. Where located in an area subject to vehicle traffic the wiring and equipment shall be located on the non-trafficked side of the pole.

Underground consumer's mains terminated on a Distributor's pole must be installed to allow flexibility at the pole base and allow for pole replacement.

In addition to the mechanical protection required by the Electricity Safety Act and Regulations, the cables:

- shall be provided with additional mechanical protection covers from the mains protection below ground level to a point at a minimum of 2.4m above ground level;
- shall be enclosed in conduit when terminated at 4m above ground level and the size is less than 70mm² SDIs and 35mm² multicore; and
- shall be terminated by the Distributor when terminated above 4m.

7.7.6.6.3 Concrete Pole Attachments

Where consumer's mains and equipment are installed on a concrete pole carrying high voltage conductor's additional insulation shall be required between the concrete pole and the termination equipment. Mounting the consumer terminal equipment on a double insulated box with a minimum air gap of 50mm between the metallic fixing bolts will achieve these requirements.

Concrete Poles shall not be drilled under any circumstances as ingress of moisture can lead to failure of the pole.

Fixing of cables and equipment to concrete poles shall be effected by banding with suitable stainless steel bands and be so arranged that the band will not directly compress on cable sheaths, but will securely attach cables and equipment to the pole.

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Figure 7.9 Typical Underground Consumer's Mains Termination on a Distributor's Pole

7.8 Specific Electrical Installations & Supply Arrangements

The following Rules apply for specific type of electrical installations and various supply arrangements.

7.8.1 Private Overhead Electric Lines (POEL)

The Electricity Safety Act and Regulations regulate the construction, protection and inspection for POEL.

POEL shall also comply to this clause, these Rules and in particular, clauses 7.3.4 (Point of Attachment, POA), 7.4.5 (Service Protection Devices) and 7.4.6 (Acceptable Applications).

7.8.1.1 Construction

The Act and Regulations require:

- the construction of a new POEL to be limited to low bushfire hazardous areas
- a POEL to be substantially re-constructed in a high bushfire hazardous area to be placed underground.
- the construction of a POEL to be in accordance with the Act, Regulations and the Wiring Rules.

Application for exemptions from these requirements must be made by the customer to the Office of the Chief Electrical Inspector in accordance with the Act and Regulations.

7.8.1.2 Protection

The Act and Regulations requires a circuit breaker to be fitted at the origin of any new POEL and where repairs are performed on an existing POEL. These Rules require that unless otherwise agreed by the relevant Distributor, the circuit breaker complies with clause 7.4.5 (Service Protection Devices) and be fitted as the service protection device and consumer's terminals for a private overhead electric line as shown in Figure 7.10; and

(a) Where the line is supplied from a Distributor's pole the customer shall:

- install the circuit breaker at 4m from ground;
- supply the POEL cable terminator to attach the line to the pole;
- supply sufficient cable to be attached to the top of the pole and extend down to the circuit breaker; and
- supply sufficient PVC rigid conduit and equipment to attach the conduit to the pole. The conduit and equipment shall be suitable to be installed in direct sunlight for enclosure of the line from the attachment to the circuit breaker.
- (b) Where the line is supplied from an overhead service cable terminating on a private pole the customer shall:
 - install the circuit breaker at 4m from ground; and
 - provide a \geq 40 mm PVC conduit attached to the pole that is suitable to be installed in direct sunlight to enclose the service line from the point of attachment to the circuit breaker.

7.8.1.3 Inspection

The Act and Regulations require Distributors to inspect all POEL within their distribution areas. It also prescribes the scope, times and standard of inspection, and the form and time in which the notice of inspection is to be provided to the customer.

Where non-compliance to the inspection criteria are identified, the notice of inspection will detail the non-compliance/s and nominate a timeframe for rectification.

Where rectification has not taken place within the nominated timeframe, advice from the Office of the Chief Electrical Inspector will determine further action, and disconnection could result.

POEL that have serious non-compliances will be disconnected on declared total fire ban days.



Distributor's Pole

Private Pole

Figure 7.10 Typical POEL Arrangements

7.8.2 Limited Period Supplies

7.8.2.1 Provision

The relevant Distributor may, subject to supply being available and the payment of relevant charges, provide a supply to an electrical installation for a limited period, eg, builder supplies.

The customer should ascertain that the supply can be made available, and the conditions which would apply before commencement of any works.

Where a supply is provided for a limited period it shall be disconnected at the time of connection of the permanent supply unless prior arrangements have been made by the customer for the retention of the supply and any relevant additional charge paid.

7.8.2.2 Customer's Electrical Installation

The Electricity Safety Act and Regulations regulate the construction of electrical installations, and includes specific standards for construction and demolition sites.

These Regulations limit the use of private poles to low bushfire risk areas. Refer to Clause 7.3 (Overhead Supplies) for Overhead Supply Rules and Clause 7.3.4.6 (POA on Private

Poles) for Rules regarding points of attachment on private poles. The Regulations and these Rules apply to private poles installed for limited periods.

The electrical installation shall be constructed in accordance with the servicing and metering arrangements as detailed in these Rules, and adequate protection must be installed to prevent damage to the Distributor's servicing and metering equipment.

Metering arrangements for limited period supplies, including exclusive metering arrangements for Limited Period Supply Poles are detailed in Section 8 (LV Metering).

7.8.2.3 Buildings in Course of Erection

Where an electricity supply is required to a building in the course of erection for constructional purposes, supply may be given when the permanent consumer's mains and metering facilities are installed in their permanent position.

The weatherproof meter enclosure must be installed in accordance with:

- the Electricity Safety Act, Regulations, Wiring Rules and these Rules;
- the manufacturer's installation instructions; and
- be securely and rigidly fixed in its permanent position installed in a manner to prevent excessive vibration or movement.

To limit additional costs, the electrical installation should be constructed in a manner to avoid the necessity for further Distributor visits, eg, be connected to permanent consumer's mains and include provision for the permanent metering equipment.

Typical arrangements are shown in Figure 7.11



Figure 7.11 Typical Arrangements, Limited Period Supplies

7.8.3 Multiple Occupancies

7.8.3.1 Plan

A plan for any electrical installation proposed to contain multiple occupancies, ie, more than one separately metered occupancy, shall be submitted to the Responsible Officer for approval prior to the intended commencement of the electrical installation.

The plan must show the location of the metered and un-metered mains and sub-mains and meter locations in relation to the main structural features and property boundaries, together with a schematic diagram indicating the proposed control, isolation and metering arrangements of the electrical installation and occupancies.

7.8.3.2 Subdivision

Where a multiple occupancy is subdivided, is intended to be subdivided, or has potential for subdivision, consideration should be given in its original design to minimise future rectification for it to comply with the requirements of the Electricity Safety Act and these Rules, particularly clause 7.8.8.4 (Subdivisions – Multiple Occupancies).

7.8.3.3 Metering

Metering is to be installed in accordance with Section 8 (LV Metering) of these Rules.

7.8.3.4 Control

The electrical installation for premises comprising a number of separately metered occupancies shall be controlled in accordance with the requirements of the Electricity Safety Act and Regulations and these Rules.

(a) Meter Panels and Occupancies

Each separate meter panel requires provision for isolation of supply in accordance with Clause 8.11.4 (Isolation of Metering Equipment).

(b) Supply Disconnection Devices (SDD)

Each separately metered occupancy meters and distribution switchboard shall be capable of individual isolation from supply by means of a Supply Disconnection Device (SDD) installed in accordance with clause 7.5 (Supply Disconnection Devices)

7.8.3.5 Supply Arrangement Diagrams

Where there is a risk of incorrect identification of the occupancies supply arrangements, including segregation between the electrical installations, occupancies un-metered wiring and switchboards and metering, supply arrangement diagrams that comply with clause 6.4 (Supply Arrangement Diagrams) shall be installed and maintained.

The location and condition of operation of any alternative source of supply to the electrical installation shall also be shown.

7.8.3.6 Labelling

Labels that comply with Clause 4.5 (Labelling) and remain clearly visible after installation of all equipment shall be provided to:

- Any switch installed on the line side of distributor metering equipment shall be labelled "TO BE OPERATED BY AUTHORISED PERSONS ONLY" and be capable of being secured in the OFF position in accordance with Clause 8.5.3 (Sealing and Locking);
- Each set of consumer's terminals, un-metered switchboard, meter panel, occupancy meter/s, SDD and occupancy switchboard to indicate the occupancy or occupancies they control or are related to;
- Any SDD supplying essential services must indicate the portion/s of the electrical installation it controls and be labelled in accordance with Clause 7.5 (Service Disconnection Devices);

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- The main entrance and the distribution switchboard for each occupancy;
- Where the occupancy consists of a number of separate areas or street addresses, each occupancy shall be labelled or identified in a manner acceptable to the relevant Distributor.

Meter Panels shall be labelled in accordance with clause 8.6 (Meter Panel Labelling)

7.8.4. Private Electric Lines on Public Land

7.8.4.1 General

In accordance with clause 5.4.1.3 (Electrical Installations on Public Land), the relevant Distributor must be contacted prior to consolidating any proposal to install an electrical installation and/or private electric line on public land, or extend wiring and equipment from an electrical installation into or across public land.

Unless a person or party has a Distribution Licence or an exemption from the need for a Distribution Licence, private electric lines installed in public land shall only be used to supply electricity to the customer responsible for those lines.

Responsibilities of existing private electric lines in public land must be ascertained prior to work taking place on the line/s, and new and altered lines shall comply with these Rules.

7.8.4.2 Definitions

Public Land - is defined in the Electricity Safety Act and includes areas such as public roads, and reserves associated with creeks, rivers and forests.

The term "public land" generally refers to land previously known as "crown land".

Supply Authority – includes the previous SECV, ESV and Municipal Councils Electricity Suppliers, and the current electricity Distributors .

7.8.4.3 Legislation Summary

Prior to 1998 options for most parties other than supply authorities to install electric lines in public land were to:

- (a) Vest the lines to supply authorities; or
- (b) Obtain an Order in Council; or
- (c) Obtain exemption to the relevant Act

When introduced, the Electricity Safety Act 1998 enabled parties such as municipal councils, Vic Roads and the Public Transport Authority to install electric lines in public land for their own purpose. Other customers and parties had the same options as existed previously.

The Electricity Safety Act 1998 Order in Council gazetted on 24 January 2002 effectively enables most customers and parties not previously enabled by the Electricity Safety Act 1998 to install electric lines in public land under the Order's terms and conditions.

7.8.4.4 Responsibilities

Vested Lines – Existing private electric lines in public land may have been installed under an agreement to vest the private lines with the supply authority under the condition they were installed and maintained by the customer, and the customer providing an indemnity to the supply authority for any liability arising from the lines. These lines are the responsibility of the current customer or party responsible for the electrical installation supplied from that line.

Orders in Council – Existing private electric lines installed within public land under an Order in Council are the responsibility of the current customer or party responsible for the electrical installation supplied from that line.

Exemptions to the relevant Act - Existing private electric lines installed within public land under an exemption from the relevant Act are subject to the exemption conditions. Generally,

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these lines are the responsibility of the current customer or party responsible for the electrical installation supplied from that line.

7.8.4.5 Current Practices

(a) Parties enabled by the Act

The introduction of the Electricity Safety Act 1998 effectively enables parties such as Municipal councils, bodies established under Part 2 of the Rail Corporations Act and the Roads Corporation to install private electric lines in public land.

(b) Order In Council – Electric Lines on Public Land Exemption

This Order gazetted on 24 January 2002 effectively enables most parties that are not enabled by the Act to install private electric lines on public land under the terms and conditions of the Order.

The Order effectively requires parties who require the installation of private electric lines under the Order to:

Have the consent of -

- the owner of any property that may be affected by the activities to which the Order relates; and
- the Distribution company to whose supply network the electric line is or is to be connected; and

Provide the Office of the Chief Electrical Inspector:

- details of the name, position, business address and telephone number of the person who has management or control of the electric line on public land and of any change in that persons contact details within 14 days; and
- sufficient information to enable the electric line to be located within 14 days of completing the installation if an electric line is installed;
- a description of how the person has complied with section 76(1)(b) of the Electricity Safety Act* if an underground electric line is installed; and
- upon the removal of the electric line on public land:
 - sufficient information to enable the Office to identify the overhead electric line removal within 14 days of the removal; or
 - a description of how the person has complied with paragraph dot point three if an underground line is removed; and
- any further information that the Office requests in writing in relation to compliance with the Order.

Other requirements of the Order include obligations for the party to:

- comply with any direction under section 141 of the Electricity Safety Act, and any request under this Order within the time specified by the Office in the request; and
- maintain a record of the electric line on public land in accordance with the Act if an underground electric line is installed and to give the person or body informed under section 76(1)(b) of the Electricity Safety Act* sufficient information to enable the person or body to identify that the electric line is removed.
- * Refer to clause 7.8.4.6 (Recording of Private Electric Lines in Public Land)

7.8.4.6 Recording of Private Electric Lines on Public Land

The Electricity Safety Act 1998 Section 76 effectively requires persons controlling private underground electric lines on public land (other than lines that are part of a railway or tramway system) to:

- Maintain a record of the line; and
- Provide a diagram of the line to an asset recording body specified by the OCEI, or if no asset recording body is specified, to the relevant electricity distributor before the line is connected to supply, or within 2 business days of relocating the line.

The OCEI:

- has specified that any body established under Part 2 of the Rail Corporations Act 1996, the Roads Corporation, and all Municipal Councils are classified as asset recording bodies; and
- that this requirement does not include Extra Low Voltage (ELV) lines, ie, lines with voltages not exceeding 50V a.c. or 120V ripple free d.c.

Therefore, except for lines controlled by specified asset recording bodies named above and ELV lines, the relevant Distributor shall be provided an accurate diagram of any underground private electric line before the line is connected to supply, or within 2 business days of relocating the line.

7.8.5 Equipment Installed on a Distributor's Pole

7.8.5.1 Use of Pole

Equipment shall not be installed upon a Distributor's Pole unless the equipment installed is:

- underground consumer's mains and its associated service protection device and consumer's terminals as detailed in Clause 7.7.6.6 (Termination on Distributor Pole) and Figure 7.9; or
- a private overhead line and its associated service protection device and consumer's terminals as detailed in clause 7.8.1 (Private Overhead Electric Lines, POEL) and Figure 7.10; or
- installed in accordance with an agreement with the relevant Distributor, the Shared Use of Poles Code, and these Rules.

Typical equipment that is subject to an agreement with the relevant Distributor and compliance with the Shared Use of Poles Code includes:

- electrical installations attached to poles for broadband transmissions and mobile library supplies; and
- parts of electrical installations containing other than consumer's terminals and service protection devices, eg; circuit breakers, residual current devices or other control gear and cabling that supply electrical installations such as bus shelters, telecommunications equipment, public lighting, sprinkler systems etc; and
- Lights, Traffic Signals, Antennas, telecommunication/broadband cabling, signs, banners, decorations, etc.

Application for installation of equipment on a Distributor's pole should be made in accordance with clause 5.4 (Application for Supply) at the earliest opportunity after a decision to proceed is made.

In all cases, where equipment other than network assets are located upon a Distributor's pole, the customer/person or body responsible for the equipment shall be responsible for the installation, maintenance and liability associated with their equipment. This shall include the removal and/or relocation of the equipment if it impedes use of the pole by the Distributor, and the removal and re-instatement of their equipment upon pole maintenance, relocation or replacement.

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Figure 7.12 Maximum Equipment on a Distributor's Pole without an Agreement

7.8.5.2 Equipment Installation

The attachment of equipment on a Distributor's pole other than that associated with an electrical installation shall be installed in accordance with the Shared Use of Poles Code and the agreement with the relevant Distributor.

Termination of underground consumer's mains and a private overhead line shall be in accordance with Clause 7.7.6.6 (Termination on Distributor Pole) and Figure 7.9, and clause 7.8.1 (Private Overhead Electric Lines) and Figure 7.10 respectively and this clause.

The construction of any electrical installation or part thereof on a Distributor's pole not covered by clauses 7.7.6.6, 7.8.1 and 7.8.6 (Electrical Installations on Public Land) shall be in accordance with Figure 7.13, these Rules, the Electricity Safety Act and Regulations, the agreement as established under the Code to install the equipment, and this clause.

Unless otherwise agreed with the relevant Distributor all electrical installation equipment shall be located in a position such that the equipment:

- is least liable to mechanical damage;
- does not obscure a Distributor's pole identification disk, mark or number;
- is on the least trafficked side of the pole where located in areas trafficked by vehicles;
- maintains integrity and be appropriately spaced from network earthing conductors; and
- does not interfere with safe access to other equipment located upon the pole

Unless otherwise agreed with the relevant Distributor consumer's terminals installed on poles shall be located at 4m above ground level. Equipment other than cables attached to pole shall not be lower than 2.7m above ground level unless otherwise agreed with the relevant Distributor.

Installation earth electrodes shall not be located within 2m of a concrete or steel pole or sub-station earthing systems.

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Figure 7.13 Typical Requirements for Installations Equipment on a Distributor's Pole

7.8.6 Electrical Installations on Public Land

7.8.6.1 General

Electrical installations supplied from and contained within public land as defined in clause 7.8.4 (Private Electric Lines on Public Land) shall comply with this clause and the other requirements of these Rules.

In accordance with clause 5.4.1.3 (Electrical Installations on Public Land), the relevant Distributor must be contacted prior to consolidating any proposal to install an electrical installation on public land.

7.8.6.2 Points of Supply and Consumer's Terminals

The point of supply and consumer's terminals for electrical installations supplied from and located upon public land shall be nominated by the relevant Distributor and shall, unless otherwise agreed be:

- within a service pit, normally at the boundary or adjacent to the portion of land the electrical installation occupies; or
- the consumer's terminals located at 4m where the electrical installation is located upon a Distributor's pole or where underground mains originate at the pole; or
- in accordance with clauses 6.2.2 (Point of Supply) and 7.3 (Overhead Supplies)

7.8.6.3 Equipment Installed upon a Distributor's Pole

Equipment on a Distributors pole in Public land shall be arranged and installed in accordance with clause 7.8.5 (Equipment Installed on Distributor's Pole).

7.8.6.4 Labelling

Electrical installation's equipment located upon public land shall be labelled where there is a risk of incorrect identification between an electrical installation's equipment and a Distributors' network assets.

Equipment that shall be labelled includes public lighting columns owned and operated by bodies such as Vic Roads and Municipal Councils, and other equipment such as pillars and cubicles where there is a risk of incorrect identification.

Labels shall include the responsible organisation and their contact telephone number and be installed in accordance with clause 4.5 (Labelling).

7.8.7 Contiguous Land

Where supply has been provided to a property that comprises of contiguous land in accordance with clause 6.2 (Point of Supplies), and the electrical installation and/or occupancies wiring extend into or across property the customer or controlling body will not have rights, shall upon the land becoming non-contiguous re-arrange the supply to comply to these Rules and the Electricity Safety Act and Regulations.

7.8.8 Subdivisions

7.8.8.1 General

A copy of any proposed Plan of Subdivision should be submitted to the relevant Distributor in accordance with clause 5.4.2 (Subdivisions) during its planning stage or as soon as a decision is made to proceed.

References that should be considered that may affect the subdivision's design include:

- clause 6.2 (Point of Supplies) and the definition of property and points of supply
- clause 7.3.3 (Consumer's terminals) and other Rules such as metering arrangements in Section 8 (LV Metering)
- the Electricity Safety Act and Regulations

Consideration for all sub-divisions should include provision of an individual POS for each property (lot) and the containment of each electrical installation's wiring within that property, except for where lines extend into or across public land in accordance with clause 7.8.4 (Private Electric Lines on Public Land).

Where an electrical installation is being designed and the development, property or building is of a type which may be subdivided, the design should be such as to minimise rectification at the time of sub-division to comply with these Rules.

To assist with a subdivision or potential subdivision electrical design, it is recommended that an Registered Electrical Contractor, Electrical design consultant, Licensed Electrical Inspector or similarly qualified person be engaged to assist with the design and development of the application.

Applicants should nominate proposed loadings for any proposed lots, and consider existing supply arrangements and the potential necessity for existing supply arrangements to be altered where applicable, prior to presenting any submission.

7.8.8.2 No Existing Electrical Installation or Supply

Where there is no electrical installation or supply within the area to be subdivided the application should include the proposed lots and the proposed loadings that have been determined in accordance with clause 7.8.8.1 (General).

7.8.8.3 Existing Electrical Installations or Supply

Where there is an existing electrical installation/s and supply within the area to be subdivided the application should include the proposed lots and proposed loadings that have been determined in accordance with clause 7.8.8.1 (General).

Where an area is subdivided into individual lots and does not contain common property, the point of supply and consumer's terminals must be in accordance with clauses 6.2 (Point of Supplies) and 6.3 (Consumer's terminals) and each electrical installation's wiring shall not extend outside the property boundary, except if and where permitted by the Electricity Safety Act and Regulations and these Rules.

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7.8.8.4 Multiple Occupancies

Where a multiple occupancy is to be subdivided and contains common property, the lots with liability to the common property shall be supplied from and arranged such that the consumer's terminals, un-metered switchboards and metering equipment are installed in common property in accordance with clauses 6.3 (Consumer's terminals), 7.8.3 (Multiple occupancies), 8.4 (Metering Panels, Surrounds and Enclosures), and 8.5 (Equipment), and all other supply arrangements must comply to these Rules.

Where a multiple occupancy is subdivided and does not contain common property, the point of supply and consumer's terminals must be in accordance with clauses 6.2 (Point of Supplies), 6.3 (Consumer's Terminals) and all the electrical installation's wiring shall not extend outside the property boundary, except if and where permitted by the Electricity Safety Act, Regulations and these Rules.



Figure 7.14 Typical Supply Arrangements (Sheet 1 of 2)

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Two Titles – Title 2 Owner/Controlling Body no longer has occupancy rights to Title 1.

Figure 7.14 Typical Supply Arrangements (Sheet 2 of 2)

Underground Services

Metered Supply



Un-Metered Supply



Typical underground service supply arrangements showing:

Point of attachment	POA	Service Protection Devices	SPD
Point of supply	POS	Meter/s	
Consumer Terminals		Supply Capacity Controllers	SCC
Fused Overhead Line Connection Box	FOLCB	Circuit Breakers	CB
Fuse Switch Disconnector	FSD	Miniature Fuse Switch	MFS

Figure 7.15 Typical Underground Service Supply Arrangements

Overhead Service Cable

Metered Supply



Un-Metered Supply



Typical underground service supply arrangements showing:

Point of attachment	POA	Service Protection Devices	SPD
Point of supply	POS	Meter/s	
Consumer Terminals		Supply Capacity Controllers	SCC
Fused Overhead Line Connection Box	FOLCB	Circuit Breakers	CB
Fuse Switch Disconnector	FSD		

Figure 7.16 Typical Overhead Service Supply Arrangements

Supply from a Distributor's Pole

Metered Supply





Land

Un-Metered Supply



Typical supply arrangements on or from a Distributor's Pole showing:

Point of attachment Point of supply	POA POS	Service Protection Devices Meter/s	SPD
Consumer Terminals		Supply Capacity Controllers	SCC
Fused Overhead Line Connection Box Fuse Switch Disconnector	FOLCB FSD	Circuit Breakers	СВ

Figure 7.17 Typical Supply Arrangements - Supply from Distributor's Pole

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Supply from Enclosed Substation

Metered Supply



Un-Metered Supply



Typical underground service supply arrangements showing:

Point of attachment	POA	Service Protection Devices	SPD
Point of supply	POS	Meter/s	
Consumer Terminals Fused Overhead Line Connection Box Fuse Switch Disconnector	FOLCB FSD	Supply Capacity Controllers Circuit Breakers Combined Fuse Switch	SCC CB CFS

Figure 7.18 Typical Supply Arrangements - Supply from Enclosed Substation

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Section 8

LV Metering

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LV Metering

8.1 Scope

These Rules apply to all new metering and alterations and additions to existing metering of energy from AGL, CitiPower, Powercor, TXU and United Energy electricity networks.

Where a situation arises where a Rule requires clarification, or where a Rule does not apply or does not exist, the Regulations and Codes apply and the Rules management committee or relevant Distributor should be contacted for advice in accordance with Clause 2.7 (SIR Management Committee Contact) and Section 3 (Distributor Areas and Contact Details).

Refer to Section 9 (High Voltage Electrical Installations for Rules applicable to High Voltage Metering).

The National Electricity Code, Electricity Customer Metering Code and other documents administered by the National Electricity Marketing Management Company (NEMMCO) and the Essential Services Commission (ESC) and the Electricity Safety Act administered by the Office of the Chief Electrical Inspector contribute to electricity metering standards.

This section is designed to provide all parties involved with LV electricity metering within Victoria with practical and detailed Rules that comply with all applicable regulations.

8.2 Tariffs & Metering

Metering configurations are dependent upon tariffs selected by the customer.

Not all Retailers offer prescribed hours tariffs for loads such as off peak storage water and space heating.

The customer or their agent must consult with the customer's Retailer at the earliest opportunity to determine tariffs for their electrical installation so metering arrangements can be determined and installed to suit.

8.3 Metering Obligations

8.3.1 General

Separate meter/s shall be provided for each individual customer and/or customer's electrical installation.

Metering equipment shall be supplied, installed and maintained by the Meter Provider and shall, unless otherwise agreed in writing, remain the property of the Meter Provider.

The customer shall provide and maintain facilities in accordance with the applicable Metering Regulations and Codes, the Electricity Safety Act and these Rules to accommodate the meters.

In general, this requires the customer to provide facilities that do not require the meter provider to interfere with the facilities and wiring to install the metering, other than that required to connect, fix and maintain the metering equipment.

8.3.2 Alterations and Additions

Unless otherwise agreed with the relevant Distributor, where the customer initiates alterations, additions or relocation of existing metering, facilities that are in accordance with these Rules shall be provided.

Where an existing timber meter boards or panel exists, the Distributor may agree to its reuse subject to the board or panel:

• having sufficient space to adequately accommodate the intended equipment;

- having minimum wiring space complying with Table 8.1 at the rear of the board or panel;
- being installed on or in an enclosure consisting of, or lined with, fire resistant material; and
- being in excellent condition and visual examination reveals no damage such as splitting, water or fire damage.

Where the Distributor agrees to the reuse of a timber meter board or panel the customer shall be responsible to provide acceptable fuses, links and equipment for the alteration to be performed by the Meter Provider. The responsibility for the installation and ongoing maintenance of the equipment is that of the Meter Provider.

Where a Meter Provider replaces a timber meter board or panel with meter facilities complying with these Rules, the ownership and responsibility for the upgraded facilities shall revert to the customer from the time of its installation.

8.4 Metering Panels, Surrounds and Enclosures

8.4.1 General

Meter mounting facilities shall be provided:

- in an approved metering enclosure with the customer's switchboard equipment; or
- in an approved meters only enclosure; or
- on an approved surround; or
- within or on facilities that are acceptable to the relevant Distributor;
- that is of a type and in a location, accessible and prepared for the meters installation in accordance with these Rules.

However, facilities which meet equal or better outcomes than these Rules may be considered in accordance with clause 2.7 (SIR Management Committee Contact).

Direct metering enclosures and surrounds that are intended to be stocked and marketed by Electrical Wholesalers and similar distributors are required to be accepted for use in accordance with clause 4.4 (Equipment Acceptance) prior to being connected to supply.

All metering panels, enclosures, surrounds and supplementary equipment shall comply with:

- The relevant Australian or IEC standard/s applicable at the time of manufacture;
- The relevant Electricity Safety Regulations, Metering Codes of Practice and the Rules applicable at the time of connection to the electricity supply network; and
- Be suitable for use in normal service conditions of;
 - Ambient air temperature-
 - Maximum 45 Degrees Celsius.
 - Minimum minus 5 Degrees Celsius.
 - Average 35 Degrees Celsius (over 24-hour period).
- Maximum altitude (above mean sea level) 2000m.
- Maximum temperature above ambient inside an enclosure- 15 Degrees Celsius.
- Maximum value of system voltage expressed as a percentage of rated voltage-106%.
- Atmospheric Conditions refer to Clause 3.5 of AS 2005 Part 10.

8.4.2 Meter Panels

8.4.2.1 Size

Meter panels shall be of a size to adequately accommodate the metering equipment to be installed upon it, and be of an equal or greater size than the meter panels dimensions detailed in these Rules for the metering equipment to be installed subject to the maximum dimensions detailed in clause 8.11.2. (Direct Connected Metering – Meter Panels) and clause 8.12.2.1 (LV CT Metering – Panel).

Consideration should be given to the possible future need for a larger size meter panel than the minimum size specified in these Rules to accommodate extra metering equipment if required.

8.4.2.2 Installation

Meter panels shall be installed:

- within an approved metering enclosure with the customer's switchboard equipment; or
- within an approved meters only enclosure; or
- on an approved surround; or
- on facilities that are acceptable to the relevant Distributor.

8.4.2.3 Materials

Meter panels shall be constructed of insulating material:

- to an equal or better standard than required by the Wiring Rules for switchboards; and
- suitable for its intended use and environment, including exposure to ultra violet where exposed to daylight.

8.4.2.4 Wiring Holes

Meter Panels shall be equipped with wiring holes:

- to suit each particular metering installation in accordance to this sections Figures where they suit the installation; and
- of a size to enable free movement of cables through the panel and termination of the conductor/s without damage to the cable insulation; and

Un-used wiring holes must be sealed in accordance with the Wiring Rules

8.4.2.5 Fixing and Sealing

The meter panel shall be:

- hinged mounted on one vertical edge of the panel and secured to the metering enclosure or surround;
- capable of being opened to an angle of not less than 80 degrees from the closed position with all metering equipment installed;
- equipped with hinges:
 - constructed of a suitable non-corroding material that will maintain a structural and dimensional fit after metering equipment has been installed;
 - of a lift-off double off-set type for meter panels installed within enclosures;
 - of a lift-off hinges for meter panels on surrounds;
- secured in the closed position by a metal fastener or fasteners which requires the use of a tool to release; and

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• able to be easily fitted with a seal to seal the panel in the closed and fastened position. A 1.6mm – 2mm diameter hole is to be provided for the attachment of a seal.

8.4.2.6 Wiring

Meter panel wiring shall be:

- wired in accordance with these Rules or the Metering Provider specifications and the Wiring Rules.
- contained in an area capable of being sealed with a meter providers seal where it is un-metered single insulated wiring.

Except for a limited period supply meter and switchboard mounted on a pole, wiring not intended for connection to the metering panel/s shall not be located in the wiring space directly behind the meter panel/s unless contained within a physically separate duct or conduit located in a rear corner of the enclosure or surround such that it does not obstruct the meter wiring space.

Unused meter panel wiring must be terminated in accordance with the Wiring Rules. Acceptable methods to comply with these requirements include the fitting of all intended metering equipment to the panel at the same time, or to ensure unused wiring is appropriately insulated and terminated at the rear of the panel or within a junction box. Supply may be withheld from any meter panel with exposed conductors.

8.4.3 Metering Surrounds and Enclosures

8.4.3.1 General

Meter Surrounds and Enclosures shall be constructed:

- to accommodate a meter panel in accordance with these Rules;
- to have the meter panel and meter wiring separate and segregated from any other area and wiring;
- to prevent the spread of fire in accordance with the requirements of the Electricity Safety Act for construction of switchboard cases and surrounds;
- to prevent access to wiring at the rear of the meter panel when the meter panel is in the closed position;
- to provide a minimum clearance at the back of the meter panel not less than that detailed in Figure 8.1;
- to be provided with suitable fixing devices to allow the meter panel to be fixed and sealed in position in accordance with clause 8.4.2.5 (Fixing and Sealing) when closed; and
- so movement of the meter panel is not be obstructed in any way and the device used to retain the hinged meter panel in the closed position is in correct alignment when all necessary equipment is mounted on the meter panel.

8.4.3.2 Meter Surrounds

Meter surrounds shall be constructed to the depth specified in table 8.1, to accommodate the meter wiring and to support the meter panel as specified in table 8.2 and 8.3, and be constructed:

- to the specifications of clause 8.4.3.1 (General) and Figure 8.5;
- of sheet steel not be less than 1.2 mm thick unless an acceptable strength is achieved with a thinner sheet which is reinforced by the manufacturing process or design or other material; and
- hot dipped galvanised with a coating weight of Z275 in accordance with AS 1397; or

- where painted, pre-treated in accordance with the paint supplier's recommendation and coated with a material such as powder coating or baked enamel giving a hard durable finish with a service life of not less than 20 years; and
- with characteristics equal to or better than steel where materials other than steel are used.

8.4.3.3 Meter Enclosures:

Meter enclosures shall take the form of a box type enclosure that accommodates the meter panel, metering equipment and may also accommodate a switchboard.

Meter enclosures shall be:

- constructed with materials specified in clause 8.4.3.2 (Meter Surrounds) and installed in a manner so that the metering equipment is completely enclosed and effectively protected from the environments it is installed in.
- provided with a clearance between the front of the meter panel and the back of the enclosure door of not be less than 175 mm for direct connected metering (up to 100A per active conductor) and 240 mm for Current Transformer metering (over 100 A per active conductor)

(a) Type not exposed to Weather or Adverse Environment

A meter enclosure not exposed to the weather may be constructed of any suitable material and may or may not be equipped with a door.

Meter surrounds may only be installed within these enclosures if the conditions of all of these Rules relating to access and the ability to work on the metering equipment can be met.

(b) Type exposed to Weather or Adverse Environment

Meter enclosures exposed to the weather or adverse environment shall take the form of a box type enclosure equipped with a hinged door secured by an effective latch and be of sufficient strength and design to withstand all reasonable elements of its installed environment and be constructed:

- to accommodate the meter panel and equipment to the specifications of clause 8.4.3.1 (General) and Figure 8.4;
- to support the meter panel as specified in Tables 8.2 and 8.3;
- to provide depth behind the panel specified in Table 8.1;
- with ventilation and draining that will minimise condensation and provide for draining of moisture that might collect in the enclosures;
- with an IP rating suitable for the installed environment, and a minimum degree of protection of IP23;
- with a hinged door fitted with:
 - a retainer when the door is open and in a position to enable work to be performed on the meter panel and equipment safely, and without interference; and
 - a latch that is easily unlatched to open the door, and which retains the door in the closed position under all conditions that can reasonably be expected; and
 - be fitted with a Victorian Power Industry type lock in accordance with clause 4.7 when installed in public land, isolated and unattended locations and where locking is considered necessary by the customer or otherwise required by these Rules.

8.4.3.4 Acceptance & Marking

Direct metering enclosures and surrounds that are intended to be stocked and marketed by Electrical Wholesalers and similar distributors are required to be accepted for use in accordance with clause 4.4 (Equipment Acceptance) prior to being connected to supply.

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Conditions for the acceptance of this metering equipment may be obtained by contacting the Management Committee in accordance with clause 2.7 (SIR Management Committee Contact).

Direct metering enclosures and surrounds that are required to be accepted shall be permanently labelled with the acceptance number provided by the Committee.

8.5. Equipment

8.5.1 Acceptance

Meter surrounds and enclosures that have been accepted in accordance with clauses 8.4.3.4 (Acceptance & Marking) and 4.4 (Equipment Acceptance) are suitable for connection to electricity supply networks.

Meter panels, surrounds and enclosures that have not been submitted and approved by the Service and Installation Rules Management Committee will be subject to approval by the Responsible Officer before connection to the electricity supply network.

Refer to Section 4 General Rules for information regarding equipment acceptance and suitability of equipment.

8.5.2 On Meter Panels or Within Enclosures

Unless otherwise agreed in writing, equipment other than that required for metering purposes, or as detailed in these Rules for a pole mounted limited period supply as shown in Figure 8.24 shall not be installed on the meter panel unless permitted by the Electricity Safety Act and Regulations and these Rules.

Meters installed by the customer for monitoring performance and energy usage shall not be located on the same panel as Electricity Supplier metering equipment.

Equipment installed on meter panels shall be mounted to allow sufficient space to accommodate all equipment to be installed upon the panel in a manner which enables connection, disconnection and reconnection of all wiring and access to all terminals without dismantling other equipment, or creating a need to remove covers of equipment other than that being worked upon.

Equipment must be securely fixed to meter panels in accordance with the Wiring Rules. Fixing screws and fasteners should not protrude through the rear of the panel in a manner that could damage conductors, or create un-earthed exposed metal.

8.5.3 Sealing & Locking

Access to terminals of un-metered equipment shall be restricted by means of sealing. Such terminals shall be segregated from terminals of metered equipment by barriers or other suitable means.

A 1.6mm – 2mm hole shall be provided in covers or facilities to fix covers of all un-metered equipment terminals for the Meter Provider to fit seals to prevent unauthorised access to the terminals.

All switches in un-metered circuits shall have provision for locking in the open (off) position.

8.6 Meter Panel Labelling

All labels shall be in accordance with clause 4.5 (Labelling) and shall remain clearly visible after installation of all equipment.

8.6.1 Single Occupancy

Every single occupancy meter panel shall be equipped with a label in accordance with clause 4.5 (Labelling) displayed on the meter panel indicating the correct street address. The correct street address can be obtained from the local municipal council.

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8.6.2 Multiple Occupancies

Each multiple occupancy meter panel shall be labelled with the correct street address for each occupancy and to indicate the relationship of meters, fuses and other equipment supplied from the meter panel.

A corresponding marking shall also be made on the conductors for each occupancy at the meter panel location to enable present and future identification of conductors.

Additional labelling of multiple occupancies shall be in accordance with clause 7.8.3.6 (Multiple Occupancies – Labelling)

8.7 Protection

The customer shall provide adequate and reasonable protection to prevent any damage to metering equipment.

The metering equipment and facilities shall be adequately protected against both advertent and inadvertent damage including: mechanical damage, effects of the weather, sea air, corrosion, damage from vehicles, vandalism and spread of fire etc.

Examples of adequate protection requirements include:

- Where metering is located within an area or in any position capable of being struck by vehicles, suitable protective barriers shall be provided and installed by the customer; and
- Where metering is installed in a location that is protected from the weather in accordance with the Electricity Safety Act and Regulations, the metering equipment shall be located:
 - in a meter enclosure; or
 - on a hinged meter panel mounted on a suitable metering surround; and
- Where metering is installed in locations exposed to the weather the metering shall be installed in suitable enclosures conforming to these Rules; and
 - be constructed of galvanised steel or an equivalent material,
 - have an IP rating suitable for the environment
 - installed in a manner to provide protection against vandalism, weather and all other external factors
 - locked in accordance with Clause 4.7 (Victorian Power Industry Lock) in isolated and unattended locations or otherwise be installed to the satisfaction of the Responsible Officer.

8.8 Location

8.8.1 General

Meters shall be located in accordance with these Rules to enable safe and ready access in accordance with clause 8.9 (Access) for installing, fixing, reading, testing, maintenance and removal of metering equipment without difficulty or hazard.

The meters shall be located:

- in a position as close as practicable to the public entrance to the property or premises;
- in areas to eliminate the necessity to enter secured areas and rooms or areas that are not normally entered by visitors or available for public access; and
- in a adequate space of not less than 1.2m wide or the width of a group of meter panels, whichever is the greater, 1.0m deep from the face of the meter panel and 2.1m high above the floor, platform or level ground in front of each metering panel;

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Clearances for meter panels shall be in accordance with Clause 8.11.1 (Clearances) for Direct Metering and Clause 8.12.2.3 (Clearances) for L.V. Current Transformer Metering.

Any gas meter, fittings, fixtures, enclosures or other obstructions installed below the metering panel shall not project further than 300 mm from the face of the wall on or in which the metering panel is mounted.

Metering equipment is required to be installed outside hazardous areas defined in AS2430 and shall be installed outside the areas defined in Figure 8.3 for domestic premises.

Where a perimeter fence restricts access between the building and the public access point, the metering equipment shall be:

- located to ensure convenient and safe access from the public access side of the fence; and
- installed in a suitable vandal resistant lockable enclosure installed in an external accessible part of the fence, which does not protrude outside the building line; or
- subject to the approval of the Responsible Officer, where an access door or gate is fitted, a VPI lock shall be installed in accordance with 4.7. This lock shall be accessible from outside the door or gate; or

Subject to availability and agreement between the customer and the Meter Provider, an alternative metering system may be installed by the Meter Provider. Additional costs may be incurred in adopting this option.

For electrical installations on properties exceeding $4,000 \text{ m}^2$ in area, the Responsible Officer shall be consulted regarding a suitable meter location.

8.8.2 Single Occupancy Domestic Electrical Installation

Unless otherwise agreed with the relevant Distributor the metering equipment shall be located:

- on the face of the residence toward a street or along the adjacent side wall within 1.5m of that face or an associated corner window of the residence to which ready pedestrian access exists and will be maintained; and
- not further than 1.5m beyond the main entrance where the main entrance is on the side of the residence, subject to access being available.

Suitable locations are shown in Figure 8.1

8.8.3 Multiple Occupancy Electrical Installations

Where an electrical installation is of a type which may be subdivided, consideration to the metering and wiring arrangements should be made at the initial wiring stage to design the electrical installation in accordance with clauses 7.8.3 (Multiple Occupancies) and 7.8.8 (Subdivisions) to minimise rectification in the event of subdivision.

Metering for single business premises within a multiple occupancy shall, unless otherwise approved by the Responsible Officer, be grouped together with the associated distribution board.

Separate occupancies metering equipment shall unless otherwise agreed with the relevant Distributor be located:

- to comply with this clause and clause 8.9 (Access) and in a position to which all occupants have common right of access;
- within common property, if the property contains common property; and
- be grouped at the main switchboard for the electrical installation: or
- be grouped at a number of distribution switchboard locations as determined by engineering considerations of supply. These conditions include voltage drop as, for

example, in the case of multi–storey buildings etc. Such locations may be in a room, cupboard or alcove set aside for the purpose which complies with Clause 8.8 (Location) and not within a single occupancy.

The door/s of rooms and enclosures housing metering equipment shall be labelled "Electricity Meters". If the door is to be locked it shall be locked with a VPI lock in accordance with clause 8.9.2 (Locks) and 4.7 (Victorian Power Industry Lock).

Notwithstanding the above, in exceptional circumstances the Responsible Officer may approve metering at individual locations on separate structures. Approval may be subject to specific conditions being met and maintained.

Where metering on separate structures has been approved, the common vehicular driveway serving the separate structures shall be deemed to be the "street" for the purpose of determining an acceptable metering location on each structure.

Refer to Clauses 7.8.3 (Multiple Occupancies) and 7.8.8 (Subdivisions) for Rules applying to potential or proposed subdivisions.

8.8.4 Public Land

Where metering equipment is required to be installed on Public Land in accordance with clause 7.8.4 (Private Electric Lines in Public Land) it shall be located in a secure enclosure or premise which is at least 2m from a Distributor pole and 1m from a service pit.

A lock shall be fitted to the metering enclosure entry in accordance with clause 4.7 (Victorian Power Industry Lock).

8.8.5 Unsuitable Metering Locations

Metering equipment shall not be installed in the following locations:

- Behind a security door or gate which is capable of being locked unless, subject to the approval of the Responsible Officer, the door or gate is fitted with a "Power Industry Lock" (See Clause 8.9.2 Locks);
- Areas to which access is normally restricted for security, health or other reasons including enclosed verandas and areas or yards which may be locked or house animals;
- Areas intended for product display such as shop windows;
- A carport associated with a single occupancy unless access to the main entrance of that occupancy is gained only through the carport, or after consultation with the Responsible Officer, there is no other available location;
- On a single occupancy building, over an external elevated area which is greater than 3.0m above finished ground level at the point at which access is obtained. (Refer Figure. 8.2);
- Above a gas meter, except where shown in Figure 8.3;
- Where the use of a ladder would be necessary;
- Over stairways, landings, ramps, in narrow passageways or in other confined spaces;
- Vehicle docks, car parks, driveways and factory passageways where the metering equipment or a person working thereon would not be effectively protected;
- Positions in close proximity to or over machinery or open type switchgear;
- Locations liable to be affected by fumes, dampness, flooding, dust, noise, vibration or other external factors of such nature as may cause deterioration of equipment or unsatisfactory working conditions;
- Hazardous and wet areas as defined in the Wiring Rules;

- Where the ambient temperature is maintained in excess of 45°C;
- Where exposed to weather unless installed in a suitably approved enclosure;
- Where there is insufficient light;
- In fire isolated stairways, passageways or corridors;
- Where access is restricted by vegetation;
- Where projections at head height would pose a hazard; and
- Gender specific areas.

As metering equipment may produce a degree of noise, it should not be installed on a bedroom wall.

8.9 Access

8.9.1 General

The customer must provide convenient and unhindered access to metering locations and equipment, and all other supply related assets at the following times:

- Meter installation, reading and planned maintenance as a minimum, between the hours of 9.00 am to 5.00 pm Monday to Friday
- At all times for supply and metering fault rectification
- At any other time agreed by Distributor or meter provider and the customer or customers agent

All occupants shall have common right of access to their occupancy's meter equipment located in a group meter location within a multiple occupancy electrical installation.

Unless otherwise agreed with the relevant Distributor access to metering equipment shall be via the closest, shortest and most convenient public pedestrian route to and within the property.

Unless otherwise agreed with the relevant Distributor or meter provider, the metering equipment shall be accessible in areas to eliminate the necessity to enter secured areas and rooms or areas that are not normally entered by visitors or available for public access.

Access to and the area around the metering equipment shall be kept clear, unobstructed, safe and clean and free of rubbish.

Where metering equipment is installed in a room or area set aside for the purpose, such room or area shall be provided with adequate illumination to AS 1680 for access.

Any elevated floor or platform used to provide access shall be fitted with a substantial and permanent railing unless otherwise approved by the Responsible Officer.

Access to elevated positions shall be provided by an approved fixed stairway or ramp and handrail. Access by means of a ladder is not acceptable.

Where a perimeter fence restricts access between the metering equipment and public access point, the metering equipment shall be conveniently and safely accessible from the public access side of the fence.

The customer shall ensure that access is not subsequently restricted or the location otherwise rendered unsuitable. Should this occur, the customer shall restore suitable access or arrange for the relocation of the metering equipment at the customer's expense.

8.9.2 Locks

Where locks are considered necessary by the customer or are required by these Rules, the customer shall arrange for the lock/to be installed in accordance with Clause 4.7 (Victorian Power Industry Lock).

Locks shall be used only on doors or gates which provide access to the property and/or to an enclosure or room housing metering equipment, and shall be accessible from outside the door or gate.

8.10 Determination of Meter Type

Where the determined maximum demand of any separately metered portion of an electrical installation exceeds 100 Amperes per active conductor, the customer in conjunction with the Distributor must determine the type of metering to be installed as CT metering may be required.

8.11 Direct Connected Metering

Direct connected metered electrical installations shall comply with clauses 8.1 to 8.11 where applicable, and the following requirements.

8.11.1 Clearances

Unless otherwise approved by the Responsible Officer, direct metered electrical installations shall be arranged to meet the following clearances:

- A maximum height of 2.1m to the top edge of the meter panel above the floor or ground;
- A minimum height above the floor or ground to the lower edge of the meter panel of 1.0m in the case of a single occupancy and 0.5m in the case of multiple occupancies; and
- A minimum of 175 mm in front of the meter panel to the inner face of the door or any internal projection where the meter panel is enclosed.

Clear space for working on meters shall be in accordance with clause 8.9 (Access).

8.11.2 Meter Panels

Meter panels supplied in accordance with clauses 8.3 (Metering Obligations) and 8.4 (Metering Panels, Surrounds and Enclosures) shall be arranged and not less than the sizes detailed in Tables 8.2 or 8.3 for the relevant size of conductors and the number and type of metering installations.

A minimum size meter panel to be installed within an enclosure shall be 400mm x 380mm and the maximum 600mm x 900mm plus 10%.

A minimum size meter panel to be installed on a surround shall be 200mm x 370mm and the maximum 600mm x 900mm plus 10%.

Where a greater number of meters are required than can be accommodated on a single panel, a suitable number of panels shall be grouped in a modular fashion.

The Responsible Officer should be consulted for arrangements other than those covered by Tables 8.2 and 8.3

Metering Panel Dimensions (mm) Width x Height	Maximum size of attached conductors	Minimum clear depth behind meter panel
All sizes	16 mm ² ; or up to four only 25 mm ²	75 mm
400 x 380; 400 x 590; 600 x 600; or 600 x 900	35 mm ²	150 mm

 Table 8.1 Meter Panel Conductor Size Limitations

The values specified in this table may not be applicable where other means, such as the use of flexible cables, are incorporated to ensure adequate flexibility.

Where conductors greater than 16mm^2 are installed due to maximum demand, the minimum spacing behind the panel shall be 150 mm deep. However, this requirement need not apply where no more than four 25 mm² conductors are attached to the meter panel.

Table 8.2 Maximum Number of Occupancy Meters per Panel –<16mm² conductors</td>

16 mm ² Stranded Conductors #	NUMBER OF SEPARATE OCCUPANCIES			
Metering Panel Dimensions (mm) Width x Height	1 Phase 2 Wire All Tariffs, One Off-Peak Load up to 30 Amps	Multi - Phase Single Rate	Multi - Phase 2 Rate	Multi –Phase Winner and Single or Multi – Phase with two Off-Peak Loads
200 x 370	1	-	-	-
400 x 380	2	1	1	Not suitable
400 x 590	4	1	1	1
600 x 600	6	3	3	Refer to Electricity Supplier
600 x 900	9	4	4	"

Table 8.3 Maximum Number of Occupancy Meters per Panel - ≤ 35 mm² conductors

Up to 35 mm ² Stranded Conductors	NUMBER OF SEPARATE OCCUPANCIES			
Metering Panel Dimensions (mm) Width x Height	1 Phase 2 Wire All Tariffs, One Off-Peak Load up to 30 Amps	Multi - Phase Single Rate	Multi - Phase 2 Rate	Multi –Phase Winner and Single or Multi – Phase with two Off-Peak Loads
400 x 380	Not Suitable			
400 x 590	4	1	1	1
600 x 600	6	3	3	Refer to Electricity Supplier
600 x 900	9	4	4	"

8.11.3 Equipment

Where applicable the customer's agent shall arrange for the supply, installation and wiring of:

- Service protection devices in accordance with clause 7.4;
- Supply disconnection devices in accordance with clause 7.5;
- Neutral and active links; and
- And other equipment required by the meter provider.

Meter panel fuses shall be spaced not less than 20mm apart where a maximum demand exceeds 80Amps per phase, to enable effective dissipation of the heat generated.

Meter wiring links shall:

- be of sufficient carrying capacity equal to or greater than the current to be carried by the link;
- have separate terminals for each conductor terminated in the link where practical;
- except for single occupancy neutral links, be mounted on the face of the meter panel or within a sealed section behind the meter panel subject to maintaining the required depth;
- be fitted with a removable insulating cover with:
 - the cover fixing screws secured within the cover when the cover is removed; and
 - sealing facilities to seal the cover to the link's base.

Phase identification of active links shall be permanently and indelibly marked.

Single occupancy neutral links shall be:

- a minimum rating of 100 Amp and 500 Volt;
- mounted on the face of the meter panel as shown in metering diagram figures; and
- equipped with the terminal for the incoming main neutral conductor clearly identifiable by means of a clamping plate terminal set at an angle for ease of conductor access and termination without accessing the rear of the panel.

Incoming mains or sub main neutral link arrangements shall be such that these conductors can be disconnected conveniently from the front of the meter panel for testing purposes.

8.11.4 Isolation of Metering Equipment

Supply to each metering panel and each occupancy metering shall be capable of being individually isolated.

8.11.4.1 Single Occupancy Metering

Single occupancy metering equipment shall be capable of being isolated by the removal or opening of the service protection device/s or supply disconnection device/s. Refer to clauses 7.4 (Service Protection) and 7.5 (Supply Disconnection Devices).

8.11.4.2 Multiple Occupancy Metering

(a) Meter Panel Isolation

Each meter panel in a multiple occupancy shall be capable of being isolated by a single switch operating in all active conductors supplying that panel.

A switch is not required where only one panel is installed and it can be isolated by means other than a switch, eg, removal of SPDs.

(b) Individual Occupancy Metering Isolation

Each individual occupancy metering shall be capable of being individually isolated by a supply disconnection device installed in accordance with clause 7.5 (Supply Disconnection Devices).

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8.11.5 Meter Wiring

Meter wiring shall be installed in accordance with the Electricity Safety Act and Regulations and these Rules.

The Electricity Safety Act and Regulations requirements include:

- The wiring to be designed and installed to withstand any thermal and magnetic effects on the conductors;
- Where provision is made to hinge or remove switchboard panels, or conductors connected to the electrical equipment on the switchboard panel shall be provided with sufficient free length to allow the panel to be moved into a position to enable work to be carried out;
- All conductors shall be suitably fixed or otherwise retained in position to avoid undue movement or stress at terminals of electrical equipment when the panel is moved or is fixed in position; and
- The conductors be identified (labelled and coloured coded) and sized to the load they are to carry in accordance with the regulations.

These Rules require:

Only multi strand soft drawn copper conductors of the following type shall be provided:

Load carrying conductors shall not be less than 4mm² or greater than 35mm²;

- 2.5mm² stranded cable for the meter register changeover switch wire/s;
- 4mm² for metering neutral conductors; and
- Not less than 18 strands for 25mm² or 35mm² conductors.

Flexible cables used for meter panel wiring shall be provided with end-terminals (boot lace ferrules) as follows:

- For 25 mm² cables ferrule shall be not less than 22 mm long and not greater than 8 mm diameter; and
- 16 mm² cables ferrules shall not be less 18 mm and not greater than 8 mm diameter.

Generic metering arrangements are shown in Section 8 Figures. Meter wiring diagrams for arrangements not shown in the generic diagrams should be obtained from the relevant Distributor. Details of off peak load control arrangements should be obtained from the Electricity Supplier.

The wiring of each metering panel shall:

- have the metered and un-metered conductors installed, prepared, connected and arranged to conform with the metering arrangements to suit the tariffs selected by the customer and ready for the installation of the metering equipment;
- conform with that shown in the wiring diagram for the relevant electrical installation type;
- be identified in accordance with clause 7.7.3 (Identification Consumer's Mains);
- have the sheath removed and a length of between 100mm and 150mm of single insulated cable through suitable holes in the correct positions ready for connection to the metering equipment as shown in Section 8 Figures ; and
- be permanently labelled at the rear of the meter panel to indicate the function of the conductor, ie, line/load, hot water, etc for the wiring to be terminated by the meter installer.

The incoming neutral conductor to a neutral link shall be clearly identified as such. Neutral conductors for each meter and time switch shall be coloured black and originate from a

terminal of a neutral link. Looping of neutral conductors between terminals of equipment is not acceptable.

Active conductors may be looped at line terminals of equipment.

Refer to clause 8.4.2.6 for unused meter wiring.

8.12 LV CURRENT TRANSFORMER METERING

8.12.1 General

Where in accordance with clause 8.10 (Determination of Meter Type) current transformers (CT) metering is to be installed, the applicable requirements of clauses 8.1 to 8.11 and the following rules shall apply.

The customer shall provide adequate space, housing and facilities for the current transformers and metering equipment as detailed in these Rules, and give the proposed electrical installation loading details and provide as much notice as possible to:

- the Meter Provider who will install the metering; and
- the relevant Distributor who will supply the current transformers and wiring loom.

8.12.2 Meter Panel

8.12.2.1 Panel

A separate meter panel shall be provided for each CT meter installation.

The meter panel size shall be a minimum of 600 mm H x 600 mm W and a maximum of 900mm H x 600mm W plus 10% for a single CT metering installation.

Direct connected metering shall not be installed on the same panel as CT metering.

8.12.2.2 Location and Access

The meter panel and equipment shall be located in accordance with clause 8.4 (Meter Panels, Surrounds and Enclosures) and accessible in accordance with clause 8.9 (Access)

Note that clause 8.12.7.2 (CT Wiring Loom) limits the distance between the meter panel and CT chamber to a maximum of 10m cable length of wiring unless otherwise agreed by the Responsible Officer.

The meter panel is not permitted in a location subject to varying high intensity magnetic fields.

Heavy current carrying conductors shall not be installed behind or near the meter panel, unless effectively shielded by an earthed metallic screen.

8.12.2.3 Clearances

Unless approved by the Responsible Officer, CT metered installations shall be arranged to meet the following clearances:

- The lower edge of the meter panel shall be not less than 1.0m or greater than 1.2m above the floor or ground level.
- A minimum of 240 mm in front of the meter panel to the inner face of the door or any internal projection where the meter panel is enclosed.
- A minimum of not less than 50 mm behind the panel

Clear space for working on meters shall be in accordance with clause 8.4 (Meter Panels, Surrounds and Enclosures).

Unless effectively shielded by an earthed metallic screen from heavy current carrying conductors, the following clearances stated in Table 8.4 shall be maintained between the conductors and meter panel:

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RATING OF CONDUCTOR (Amps)	DISTANCE BEI NEAF	RTWEEN METER PANEL AND THE REST CONDUCTOR (mm)
500	200	
1000	400	Interpolate for intermediate values
2000	600	
3000	800	

Table 8.4 Conductors to Meter Panel Clearances

8.12.2.4 Wiring

Unless otherwise required by the Responsible Officer, the preparation, provision and installation of the meter panel wiring, meters and associated equipment shall be the responsibility of the Meter Provider.

The meter panel shall be prepared and wired in accordance with Figure 8.31, and all wiring shall be connected in accordance with Figure 8.32.

The responsibility for provision and installation of the wiring loom shall be in accordance with clause 8.12.7.2 (CT Wiring Loom).

Where the Meter Provider requires, the meter panel shall be delivered to their premises to enable preparation of the meter panel prior to visiting the site.

8.12.3 Current Transformers

8.12.3.1 General

Facilities separate and distinct from the meter panel facilities shall be provided for the current transformers in accordance with this clause.

8.12.3.2 Types & Supply

Current transformers shall be supplied by the relevant Distributor. The sizes of metering current transformers used may vary and advice should be obtained from the Responsible Officer regarding the type to be used in any specific project. Those in common use are:

ESAA* Type S	200/5 A Single Ratio
ESAA* Type B	400-800-1200/5 A
ESAA* Type C	1000–2000–3000/5 A
ESAA Type T	800/5 A Single Ratio
Type W	1500/5 A Single Ratio

*ESAA means Energy Supply Association of Australia Limited.

Typical dimensions for current transformers are provided in Figure 8.29.

8.12.4 CT Isolation

Isolation of current transformers shall be in accordance with clause 7.5 (Supply Disconnection Devices), clause 7.8.3.4 (Multiple Occupancies – Control) and the following:

8.12.4.1 Single Occupancy

Current transformers for a single occupancy electrical installation shall be located on the supply side of the main switch and be arranged to allow isolation of supply to the CT's by means of a service protection device.

8.12.4.2 Multiple Occupancy

Current transformers for a multiple occupancy electrical installation shall be located where they can be removed or replaced without interrupting supply to other customers.

Where occupancies are dependent on a CT metered supply for ancillary services such as public lighting, air conditioning and fire services and they cannot be occupied without such services, separate isolation of the ancillary services is optional.

8.12.5 CT Enclosures

8.12.5.1 General

Metering current transformers shall be mounted in a dedicated enclosure in the form of a box type enclosure equipped with a hinged door which will accommodate the CTs in accordance with Figure 8.28 and Figure 8.29 and their associated wiring and equipment.

MEN connections and wiring and equipment other than that required for metering purposes shall not be located within a CT enclosure.

CT enclosures shall be constructed of materials used for meter enclosures and surrounds specified in clause 8.4. (Metering Panels, Surrounds and Enclosures).

The minimum space inside the CT enclosure shall be not less than :

- For in-line mounting arrangement 620 mm W x 400 mm H x 300 mm Deep.
- For trefoil mounting arrangement 500 mm W x 600 mm H x 300 mm Deep.

Adequate additional space shall be provide to allow for cable terminations or entry of cables.

The minimum space required for terminating a Distributor's service cable within a CT enclosure shall be in accordance with clause 7.2 2 (Underground Services).

The clear opening through which access to the CT's is obtained shall not be less than:

- In-line mounting arrangement 560 mm x 340 mm
- Trefoil mounting arrangement 440 mm x 540 mm

The enclosure shall not be less than 300 mm deep with ready access to the CT's at all times.

The CT enclosure shall be fitted with a hinged door or hinged panel which must have provision for sealing in accordance with Clause 8.5.3 (Sealing and Locking)

The door shall be:

- hinged on a vertical side and capable of being secured in the open position at a minimum of 90 degrees to the closed position: or
- hinged at the top if the door is capable of being secured in the open position at a minimum of 170 degrees to the closed position; and
- equipped with:
 - a handle to open and close the door;
 - a latch or securing device to retain the door in the closed position;
 - sealing facilities to enable the door to be sealed in the closed position by the meter provider;
 - locking facilities for a padlock with a 5.5mm diameter hasp if the enclosure is in an outdoor location unless otherwise approved by the Responsible Officer; and
 - a label "Electricity Metering Transformers" complying with clause 4.5 (Labelling)

8.12.5.2 Location

Clause 8.12.7.2 (CT Wiring Loom) limits the distance between the meter panel and CT enclosure to a maximum of 10m cable length of wiring unless otherwise agreed by the Responsible Officer.

Clear space for working on CTs shall be a minimum of 1.2m wide, 1m deep from the CT terminals and of sufficient height to allow work to be performed safely on the CTs.

Unless otherwise approved by the Responsible Officer the minimum mounting height from the floor to the bottom of the lowest C.T. shall be 500 mm and the maximum mounting height to the top of the highest CT shall be 3m.

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8.12.5.3 Access

The enclosure shall be installed in a position that has access in accordance with clause 8.9 (Access) and be located in a position to enable work on the CTs to be performed safely and conveniently.

Access to the CT enclosure door and equipment within the enclosure shall be such that persons accessing the enclosure are not exposed to live equipment other than that within the CT enclosure.

8.12.6 CT Mounting

The customer shall provide the necessary primary conductors and install the CT's.

Friction clamping of CT's to busbars is not acceptable. Methods of mounting current transformers shall be in accordance with this clause and Figures 8.29 and 8.30, ie:

- "in-line" (ie. The bodies of each CT are in the one line); or
- "trefoil" where the centre phase CT is offset from the other two.

For "trefoil" arrangements, the spacing between centres of busbars shall not be less than 125 mm for currents up to 1200 A and not less than 150 mm for currents above 1200 A.

The mounting of CTs shall be such as to allow sufficient space:

- to terminate the primary and secondary conductors;
- to provide for easy CT removal and replacement
- to provide safe access to CT secondary terminals for tap changing and sealing of terminal covers.

CT's shall be mounted with the label "This side to Incoming Supply" or P1 or face with a red dot facing the incoming supply.

The secondary terminals of the CT's shall face outwards for accessibility and testing purposes and be as close as reasonably practical to the access of the enclosure and not more than 300 mm behind the closed door.

The conductor passing through the CT window shall be in the form of a removable section of busbar not less than 300 mm in length as shown in Figures 8.29 and 8.30. The size of the busbar must provide for an air gap between the busbars and the CT window.

8.12.7 CT Meter Voltage and Current Wiring

CT Meter Voltage and Current Wiring shall be connected in accordance with Figure 8.33.

8.12.7.1 Fuses

The customer shall provide three 32 A fuse units that shall;

- be HRC, 440 V with 32 A staggered offset tag cartridge fuse to AS 2005;
- form part of the active metering voltage supply circuit;
- be installed within the CT enclosure and connected to the active conductors on the line side of the CTs;
- be positioned to enable the fuse wedge to be withdrawn directly toward the operator; and
- be mounted in the top left or right hand front corner of the CT enclosure; or
- be busbar mounted.

Cables used to connect the fuse units to the active conductors on the line side of the CTs shall be minimum size of 4 mm^2 SDI cable arranged to minimise the likelihood of a short circuit developing over the life of the electrical installation, ie, no potential to contact a busbar or conductor of the opposite phase, or exposed metal.

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8.12.7.2 CT Wiring Loom

The relevant Distributor shall provide a standard 7 core 2.5mm² wiring loom installed within facilities provided by the customer between the CT enclosure and meter panel.

A maximum route length of a standard wiring loom shall be 10m.

Where a longer route is required, the circumstances shall be referred to the Responsible Officer to enable the calculation of burdens and selection of appropriate conductor size.

Where conductors greater than 2.5 mm² are necessary the customer will be;

- required to meet the costs involved; and
- may be required to provide and install conductors, complete with identification in accordance with Figure 8.32, to the satisfaction of the Responsible Officer.

Within a switchboard, provision for the loom shall be provided in the form of channels, holes, knockouts or conduit of adequate sizes to install the loom.

Where the meter panel and CT enclosure are remote from one another, a 32 mm conduit shall be provided to accommodate a standard loom, and the Responsible Officer may specify a larger conduit where other than a standard loom is to be installed.

Unless otherwise agreed by the Responsible Officer, the conduit shall be rigid, and bends shall be used to negotiate corners and their number shall be kept to a minimum. The use of elbows is not acceptable.

A draw wire shall be provided where the loom is not installed at the time of the conduits installation.

A fixed neutral terminal comprising of a 6mm tapped hole with a brass metal thread equipped with a flat and lock washer and nut where required shall be provided for the connection of the metering neutral in each CT enclosure.

The terminal shall be connected to the neutral associated with the active conductors being metered or the consumer mains neutral prior to the CTs.

Where the neutral conductor does not pass through a connection within the CT enclosure, the conductor supplying the terminal shall be double insulated and a minimum size of 4mm².

The tee off connection shall be located in an area and which is segregated from all other wiring and equipment, labelled "metering neutral", and provided with facilities to seal the area with a Distributor's seal.

Earthing of metal metering and CT enclosures shall conform with the requirements of the Electricity Safety Act and Regulations, including size of earthing conductor. Where earthing of a separate metering enclosure is required, the earthing conductor may be installed within the conduit containing the loom.




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Notes

- 1. If dimension 'H' exceeds 3.0m, metering equipment shall be installed on lower portion of structure.
- 2. Acceptable meter locations to also comply with Figure 8.1

Figure 8.2 Acceptable Meter Locations for Elevated Premises



Figure 8.3 Meter Enclosure Near Gas Meters & L.P.G. Exchangeable Gas Cylinders for Domestic Installations

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METER PANEL SIZE		INTERNAL DIMENSIONS		
ʻA'	'B'	Min. space in front of Meter Panel	Space Behind Meter Panel 'C'	
400	380	180		
400	590	180		
600	600	180	In accordance with Table 8.1	
600	900*	180		
CT Metering Only				
600	600	240		
600	900 *	240		

*Maximum size meter panel permitted 600x900mm + 10%

NOTES:

- Suitable flashing may be required to prevent entry of moisture into enclosure if the enclosure is to be exposed to the weather. Particular attention should be paid to sealing around the door. The degree of protection shall be minimum IP23 as defined in AS 1939, and suitable for the environment as per AS/NZS 3000:2000 Clause 1.9 Adequate drain holes shall be provided in the bottom of the enclosure.
- 2. Meter Enclosure:- Constructed of galvanised sheet not less than 1.2mm thickness (or other acceptable metal sheet).
- 3. Refer to Clause 8.4.2.6 regarding provision for wiring not intended for connection to metering equipment.
- 4. The design and construction of a non-commercially manufactured meter box and panel shall be approved by the Responsible Officer.
- 5. Provision for sealing is required when panel is in the closed position.
- 6. Refer Clause 8.4 for further details regarding meter enclosure and panel requirements.
- 7. Provision for earthing shall be in accordance with AS/NZS 3000.

Figure 8.4 Meter Enclosure - Metal



Figure 8.5 Typical Meter Panel Metal Mounting Surround

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LV Metering













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ю.





LV Metering





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MAIN SWITCHBOARD AND METERS IN COMMON PROPERTY

Figure 8.20 Typical Arrangement for Separately Metered Occupancies

LV Metering



NOTES

Occupancy Meter Panel

- 1. A plan of the installation showing the location of the metered and unmetered mains and submains in relation to the main structural features, together with a schematic diagram indicating the control, isolation and metering arrangements of the installation, shall be submitted to the Responsible Officer for approval prior to the intended commencment of the installation.
- 2. For simplicity wiring shown only for occupancies 1 and 2.
- 3. Attention to AS3000 regarding switches controlling essential services.

Figure 8.21 Typical Wiring Diagram for Separately Metered Occupancies Including CT Metering for Proprietor



- 1. SF Service fuse (Supply Disconnection Device).
- 2. A plan of the installation showing the location of the metered and unmetered mains and submains in relation to the main structural features, together with a schematic diagram indicating the control, isolation and metering arrangements of the installation, shall be submitted to the Responsible Officer for approval prior to the intended commencment of the installation.
- 3. Attention to AS/NZS 3000 regarding switches controlling emergency services.

Figure 8.22 Typical Wiring Diagram for Four CT Metered Occupancies and Proprietor with Direct Connected Metering



LV Metering



Meter enclosure, panel, equipment and wiring to be in accordance with clauses 8.3 to 8.12. *Fuse SPD to have locking facility in accordance with clause 7.4.33, if on construction site.

Meter Panel Size		Internal Dimensions	
'A'	'B'	Space in front of panel	Space behind meter panel 'C'
400	380	180	As per Table 8.1

Figure 8.24 Typical Arrangement for Limited Period Supply Pole





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Figure 8.26 Time Switch Drilling Template

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Figure 8.28 Multi Phase Electronic Meter Drilling Template

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DESIGNATION *	MAX WIDTH (W)	MIN WINDOW DIA. (d)	POSITION OF WINDOW CENTRE (h)	MAX HEIGHT (H)
S	130	45	65	165
В	165	85	85	230
С	200	112	85 or 115	270
Т	167	85	95	210
W	167	112	95	210

DIMENSIONS (mm)

NOTE: REFER CLAUSE 8.12.3.2

CURRENT TRANSFORMERS



 For circuits carrying greater than 1200A, spacing shall be increased to not less than 150mm.



MINIMUM SPACE IN CUBICLES FOR CURRENT TRANSFORMERS ONLY

Figure 8.29 Dimensions of Current Transformers and Minimum Space Required in Enclosures for Current Transformers

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- NOTES 1. Dimensions of all cubicles, front to rear are 300mm.
 - 2. These drawings do not show 32 Amp meter voltage supply fuses in enclosures.
 - 3. For terminating distributor cables, additional space may be required inside enclosure.

Figure 8.30 Minimum Space Required in Enclosures for Current Transformers



Figure 8.31 Standard Current Transformer Meter Panel Layout

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Section 9

High Voltage Electrical Installations

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9.1 Scope

This Section details a Distributor's requirements for Customers taking supply at high voltage, up to and including 22 kV and provides guidance for 66 kV installations. The purpose of this Section is to ensure the Customer's high voltage installation consists of suitable equipment, provides a safe environment to operating personnel and the general public and does not adversely affect the Distributor's supply system.

These requirements are additional to the requirements of Electricity Safety Act and Regulations and apply to both new installations, and alterations or extensions to existing Customer installations.

For loads above 10 MW which are either likely to grow or cause significant voltage fluctuations to the Distributor's supply system, supply at 66 kV should be considered.

This section also applies to embedded generators connecting to the network at high voltage.

9.2 Contractual Arrangements

A Customer requiring a supply of electricity at high voltage shall be required to enter into:

- an Electricity Supply Contract with a Retailer; and
- a specific electricity distribution connection agreement or contract or a deemed electricity distribution contract.

And where applicable:

- an Extension Agreement with the Distributor; and/or
- an electricity distribution demand tariff agreement or contract

Refer to the Essential Services Commission for additional information for electricity market operation.

9.3 Systems of Supply

The Distributor will negotiate the system of supply and the voltage of supply with regard to the proximity of its relevant high voltage systems to the Customer's point of supply and the nature of the Customer's load.

One of the following nominal supply voltages may be made available :-

- 6.6 kV;
- 11 kV;
- 22 kV; or
- 66 kV.

As most of the existing 6.6 kV areas of supply are scheduled for conversion to either 11 kV or 22 kV, any Customer currently taking supply at 6.6 kV should take this into account.

The supply shall be made available at a nominal frequency of 50 hertz (cycles per second).

9.4 **Preliminary Information**

The Customer should provide the earliest possible notice (preferably 12 months) to their selected Retailer and the Distributor of the intention to plan for a high voltage supply.

The following preliminary information shall be provided to the Distributor:

• A single line diagram of the proposed installation. (Refer Figure 9.1)

- An overall site plan showing the location of the HV equipment;
- The preferred Point Of Supply (new installation);
- The anticipated maximum demand (MVA) required for the installation;
- Any proposed on-site generation;
- Any disturbing loads (eg. large motors, arc furnaces, etc).

Negotiations should precede detailed design work, placement of orders for equipment and letting of contracts to avoid loss to the Customer arising from designs or equipment being found by the Distributor to be unsuitable for connection to the supply system.

9.5 Installation Design

The installations supply, protection, earthing and metering arrangements shall be:

- Installed to the satisfaction of the relevant Distributor; and
- Arranged to comply to the requirements of clause 6.5 (Supply Loading) and the Electricity Distribution Code in respect to interference to the Distributor's supply system: and
- Comply with all applicable Regulations, Codes of Practice and these Rules.

Standards which should be referenced and installation components which should be considered include the items listed in the Appendices attached to this Section.

9.6 Conversion from Low Voltage to High Voltage Supply

Taking supply at high voltage may involve the transfer of ownership of high voltage assets. It may also be necessary to modify existing assets to comply with the Electricity Safety Act. These contract conditions are to be negotiated with the Distributor.

9.7 General Design

9.7.1 Circuit Connections

The normal supply arrangement is via a single Distributor high voltage feeder.

Arrangements can usually be made for a second high voltage feeder where required. Paralleling of high voltage feeders may be permitted subject to the conditions as detailed in Clause 9.7.2

9.7.2 Control of Incoming High Voltage Supply

The main switch or switches shall consist of an automatic circuit breaker capable of making and breaking the maximum prospective fault currents on all three phases.

The main switch or switches shall be:

- located as near as possible to the Customer's Point of Supply; and
- readily accessible to authorised persons; and
- provided with adequate means of isolation for maintenance purposes.

Normally, where more than one high voltage supply is provided to a Customer, the main switches shall be interlocked in such a manner that paralleling of the high voltage supplies shall not be possible.

Where technically feasible, consideration will be given to allowing momentary paralleling of the Distributor's high voltage feeders, to permit transfer from one feeder to the other without interruption to supply.

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Permanent paralleling of high voltage feeders to provide a no break supply may also be considered, subject to the installation of additional protection at the zone substation and the Customer's installation at the Customer's expense.

9.8 Protection

The main switch or switches shall be fitted with a protection system which is compatible with the Distributor's high voltage protection system. The Customer shall test the main protection system at the time of commissioning the installation to demonstrate that the performance meets the design parameters.

Prior to placing orders for equipment the customer shall discuss the installations protection requirements with the Distributor.

All circuit breakers shall be fitted with at least three phase overcurrent and earth fault protection that incorporates three phase tripping (lockout) as a minimum. More complex protection arrangements may be required, in particular cases to meet acceptable protection performance criteria depending on the Customer's installation arrangement, the Distributor's system arrangement and the required protection performance levels.

It is preferred that current transformers for overcurrent protection be located on the supply side of the main circuit breaker.

Protection settings and equipment shall be subject to the acceptance of the Distributor prior to commissioning. Any modification of the settings shall be subject to the acceptance of the Distributor.

In general the Customer's primary phase fault protective devices for faults at the voltage level of the supply shall detect and clear the bolted short circuit faults not greater than 150 milliseconds at the fault level nominated at the point of supply. Any proposed operating time greater than 150 milliseconds shall be discussed with the Distributor at an early stage.

9.9 Insulation Co-ordination

The safety clearances, separation of live parts, and insulation levels (impulse strength) shall be in accordance with AS 2067 and AS 1824.1.

9.10 Short Time Withstand Current

High voltage switchgear, conductors, associated equipment and earthing systems shall be capable of withstanding the maximum fault current which may be imposed on it for a duration of at least one second and in some instances for three seconds.

The maximum design fault current for the various supply voltages are as follows:

- 66 kV 21.9 kA (2500 MVA)
- 22 kV 13.1 kA (500 MVA)
- 11 kV 18.4 kA (350 MVA)
- 6.6 kV 21.9 kA (250 MVA)

Actual fault currents and their maximum duration at any particular location on the Distributor's high voltage system will be made available upon request.

9.11 Earthing

9.11.1 General

The earthing system of the Customer's high voltage installation shall comply with AS/NZS 3000 and these Rules.

Special attention should be paid to the management of "step and touch" potentials that may occur under earth fault conditions associated with any earthing system installed within a customer's installation. Particular attention should be paid to the separation of independent earthing systems and the proximity of earthed infrastructure such as metallic fences and buildings to earthing systems so as to avoid the possibility of hazardous step and touch potentials.

Earthed primary neutral windings are not permitted on any transformer of the nominal supply voltage. It is recommended that the Customer use Delta–Star transformers to comply with this requirement.

9.11.2 Size of Earthing Conductors

Earthing systems shall be designed to withstand the maximum system design fault current levels as specified in clause 9.10 (Short Time Withstand Currents).

All conductors used within the customers installation for combined or separate earthing systems shall have a minimum equivalent copper cross–sectional area as follows :–

- Subtransmission voltage earthing conductors: 66kV 120 mm²;
- High voltage earthing conductors:
 - 22 kV 70 mm²,
 - $11 \text{ kV} 95 \text{ mm}^2$;
 - $6.6 \text{kV} 95 \text{mm}^2$
- Low voltage earthing conductors : 120 mm²;

9.11.3 Earthing of Metering Equipment

The enclosure of the meter, metering transformers and any metal supporting structure/s shall be connected to the same earth grid as the Current Transformer and Voltage Transformer secondaries (see Figures 9.5 and 9.6). The size of earthing conductors used for this purpose shall be in accordance with clause 9.11.2 (Size of Earthing Conductors).

A suitable earth grid is required for all metering installations. The specifications contained in Figure 9.6, concerning the earthing grid, are minimum requirements

9.12 Distributor's Acceptance Requirements

The Customer shall submit the following details for written acceptance prior to supply at high voltage being made available:

- Final single line diagram;
- Agreed maximum demand;
- Main circuit breaker specification;
- Protection settings for main circuit breaker;
- Compliance to Distribution Code, eg. Systems study, etc;
- Copy of HV Metering VT and CT test certificates refer to clause 9.13.3 (Metering Transformers)

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Before final connection is made the customer must provide :

- The Electricity Suppliers Copy of the prescribed Certificate of Electrical Safety;
- A copy of:
 - the installations HV operating procedures; Refer to Clause 9.15.1 (Operating Procedures)
 - commissioning and test certificates as determined by the Customer and as prescribed by AS/NZS 3000 which must include trip tests on the incoming circuit breaker; Refer also to clause 9.14 (Testing and Commissioning)
 - HV plant and equipment maintenance plan. Refer to Clause 9.15.3 (Maintenance)
- Contact details for Customer authorised HV operators; Refer to Clause 9.15.2 (Trained Operators)
- HV clearance to energise the installation;

9.13 Metering

The following high voltage metering requirements are applicable to single feeder high voltage installations (up to 66 kV) and are consistent with the National Electricity Code, the Victorian Electricity Supply Industry Metrology Procedures and the Electricity Customer Metering Code.

Other high voltage installations such as dual high voltage feeders and cogeneration installations will require additional provisions.

9.13.1 General Requirements

Metering equipment shall be installed by the Meter Provider in accordance with the applicable requirements of Section 8 LV Metering and the following specifications. These include:

- A clear, illuminated (during normal business hours), paved and level space as specified in Clause 8.9 (Access), shall be provided in front of the metering position to allow access for meter reading and to accommodate test personnel and their equipment. A clear space 1.0 m deep is required in front of the meter position for safe access by Meter Provider and Distributor personnel.
- Access must be direct (ground floor), or by stairs or lift. Ladder access is not acceptable.
- Metering equipment shall not be installed in unsuitable locations as described in Clause 8.8.5 (Unsuitable Metering Locations) and in locations where an entry permit is required.
- Metering equipment must not be subjected to industrial contamination, extremes in temperature, or vandalism.
- Enclosures must comply to the same requirements contained in Clause 8.4 (Metering Panels, Surrounds and Enclosures).

9.13.2 Single Feeder Metering Requirements

9.13.2.1 Meters Panels

The customer shall provide the meter panel/s and a suitable enclosure or surround for mounting a lift–off hinged panel on which to mount the metering equipment. For details see Figures 8.4 and 8.5.

A clear space of 2.1 m high by 1.2 m wide is required to provide access for mounting of metering equipment. See Clause 8.8 (Location).

The minimum size meter panel for HV metering shall be 600mm X 600mm, however in some cases a 900mm high and 600mm meter panel may be required.

Meter enclosures shall comply with Clause 8.4. The door on meter enclosures shall be labelled "Electricity Meters".

The Meter Provider will normally provide and install the wiring for the meter panel.

9.13.2.2 Freestanding Meter Enclosures

The Customer shall install and maintain:

A metering enclosure (cubicle) complying with the requirements of Clauses 8.4 (Meter Panels, Surrounds and Enclosures)

The metering enclosure (cubicle) foundations and supporting structure to the specifications shown in Figures 9.2 & 9.4.

A formed all-weather roadway for vehicles to the meter position.

9.13.3 Metering Transformers

9.13.3.1 Compliance

Voltage transformers shall comply with AS 1243, "Voltage Transformers for Measurement and Protection", and the current transformers shall comply with AS 1675, "Current Transformers for Measurement and Protection". The transformers shall meet the performance requirements detailed in Table 9.1.

The metering transformers shall be solely for metering purposes and are not to be used for other purposes such as protection or load monitoring.

Metering transformers mounted within the Customer's high voltage switchgear shall only be acceptable if approved by a Meter Provider.

Test certificates from a NATA registered laboratory shall be provided to the relevant Distributor and the Meter Provider prior to installation. The test certificate shall show conclusive evidence that the transformers comply with the relevant Australian Standard specification.

The following minimum information shall be written in English and be included on the test certificate:-

- Serial No.
- Make
- Rating
- Burden
- Class
- Specification
- Date of Test
- Proof of compliance with high voltage insulation requirements.
- Test ratio(s), Burden(s), Currents, Voltages. Absolute values of Magnitude and Phase
- Errors at each test point.
- Statement of uncertainty in determination of errors.

9.13.3.2 Test Facilities

A current transformer test marshalling point shall be provided within the meter cubicle for Burden testing in a readily accessible location. The test marshalling point shall be fitted with sealing facilities for the Meter Provider.

These facilities must not be located within the high voltage chamber. Refer to Figure 9.7 for a typical wiring diagram test marshalling point.

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9.13.3.3 Mounted in Switchgear

The following requirements must be met when metering transformers are mounted in high voltage switchgear:-

- The metering transformers must be mounted within a HV chamber which is able to be placed under the Meter Providers seals. The HV chamber design must be approved by the Meter Provider prior to purchase and construction.
- The layout of the transformer will be such that identification of transformer polarities can be readily established, and such that there is ready access to the secondary terminals of all transformers.
- No other devices apart from metering equipment (with the exception of anti-condensate heaters) shall be located within the HV chamber.
- The voltage transformers will be permanently mounted within the metering HV chamber.
- The secondary terminals of the metering transformers must be easily accessible.
- The secondary windings of the voltage transformers shall be protected with 32 Ampere HRC off set tag fuse cartridge and fittings equipped with 10 Ampere fuse links located with the test marshalling point.
- The white phase secondary winding of the voltage transformer, which is earthed, must not be fused. Refer Figure 9.7.
 - The metering transformers shall be installed on the supply side of the Main Incoming Circuit Breaker. Provision for Customer switching or isolation prior to the metering transformers is not permitted.
 - Secondary wiring from the current transformers test marshalling point to the meter position shall be hard wired.
 - Provision shall be made within the HV chamber for the bonding of all high voltage conductors to earth, to facilitate disconnection of supply and work to be carried out on the metering transformers.
 - The current and voltage transformers shall be completely encapsulated with the secondary terminal box part of the resin body of the transformer.

9.13.3.4 Supplied From an Underground Cable

(a) Located Outdoors

Metering transformers shall be installed within an enclosure mounted on a concrete pad supplied and installed by the Customer in accordance with Figure 9.5 and 9.4.

(b) Located Indoors

Where metering transformers are located indoors and enclosed in a cage or cubicle, the requirements of Clause 9.13.3.1 (Compliance) shall apply in addition to the following.

The transformer enclosure shall be designed and installed in accordance with the requirements of AS 2067. A cubicle shall comply with, and meet at least the minimum space requirements as shown in Figure 9.5.

The Customer shall provide and install a minimum of a 32mm conduit for the secondary wiring from the transformer enclosure to the metering position. Secondary wiring will be supplied by the Meter Provider, but shall be installed by the Customer in those conduits.

The enclosure shall also contain a suitable earthing bar between the CT's and VT's to allow for the earthing of secondary wiring circuits.

Locking facilities suitable for padlocks (10 mm hasp) must be provided for securing of the metering transformer enclosure.

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9.13.3.5 Pole Mounted Metering Transformers - Overhead Supply

The customer shall supply and maintain the pole and attached hardware to support the Distributor's metering transformers.

Pole mounted metering transformers shall be mounted on a pole structure in the manner shown by Figure 9.3.

DESCRIPTION	REQUIREMENT
Voltage Transformers	
ratio – 11 kV	11 000 / 110 V
ratio – 22 kV	22 000 / 110 V
class	0.5 M
rated burden	4 mS for three phase units or 12 mS for single phase units
rated output	50 VA (min)
voltage factor	1.9 / 30 s
insulation level – 11 kV	28 kV (PFWV), 95 kV (LIWV)
insulation level – 22 kV	50 kV (PFWV), 125 kV (LIWV)
Current Transformers	
ratio	100 – 200 / 5 A or 200 – 400 / 5 A
class	0.5 M
rated burden	0.6 ohm
rated output	15 VA
thermal limit current	
100 – 200 / 5 Amps	300 A
200 – 400 / 5 Amps	600 A
rated short time current – 11 kV	18.4 kA / 2 s
rated short time current – 22 kV	13.1 kA / 2 s
insulation level – 11 kV	28 kV (PFWV), 95 kV (LIWV)
insulation level – 22 kV	50 kV (PFWV), 125 kV (LIWV)

Table 9.1 Metering Transformers Performance Requirements

9.14 Testing and Commissioning

The Electricity Safety Act requires that an inspection of new or altered high voltage equipment constituting prescribed work must be performed in accordance with the regulations prior to connection of supply.

The high voltage equipment shall be tested on site in accordance with the requirements of the Wiring Rules and other relevant Australian Standards as deemed necessary by the Distributor. These tests shall be performed by a competent testing organisation.

Routine test reports on all high voltage electrical equipment up to and including the main switch shall be submitted to the Distributor for approval prior to supply being made available.

The Distributor will not connect the whole or any part of the installation which in the opinion of the Distributor is unsatisfactory for connection to the supply system.

9.15 Customer's HV Installation Operation and Maintenance

9.15.1 Operating Procedures

The Electricity Safety Act requires HV customer's to have, maintain and use up to date HV Operation Procedures and a trained operator.

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The minimum operating procedures for customer's high voltage installations are set out in the "Code of Practice on Electrical Safety in the Victorian Electricity Supply Industry (Blue Book)".

The Customer shall provide to the Distributor a copy of the Customer's high voltage operating procedures, prepared in accordance with the "Blue Book".

9.15.2 Trained Operators

The Customer shall ensure that high voltage switches, other than control switches designated for the use of plant operators, shall be operated only by persons selected and authorised by the Customer for that purpose.

The customer shall ensure 24-hour availability of a suitably trained High Voltage Operator to undertake switching operations on the high voltage assets as required by the Distributor for the purpose of inspection of HV metering transformers, load shedding, routine maintenance and emergency repair of the incoming high voltage supply cable.

The customer must provide the Distributor with a current list of their authorised high voltage operators. This list must be made available to the Distributor's operational control centre.

9.15.3 Maintenance

A Customer who takes supply at high voltage shall ensure that the high voltage installation is maintained in good order to ensure that any malfunction will not create a hazard or cause interference to the Distributor's supply system.

The Customer shall provide a written maintenance proposal for the Main Incoming Circuit Breaker before supply is made available.



Figure 9.1 HV Customer Example

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High Voltage Electrical Installations



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Considerations for High Voltage Installations

This appendix is to provide advice to customers of some of the issues to be considered when planning for and designing a high voltage installation.

Consideration of the following is considered good industry practice.

A1 Equipment and Standards

Relevant Australian Standards for plant and equipment, including, but not limited to :-

- Circuit Breakers AS 2006, AS 2067, AS 2086, AS 1824
- Transformers AS 2374
- Underground Cables AS 1026, AS 1429.1
- Motors AS 1329
- Motors and Generators AS 1359
- Current Transformers AS 1675
- Voltage Transformers AS 1243
- Protection Relays IEC 60255
- High Voltage Fuses AS 1033 or IEC 282

A1.1 Circuit Breakers

- manufacturer;
- type number;
- class indoor or outdoor;
- rated voltage;
- rated insulation level (lightning impulse withstand level);
- rated load current;
- rated short circuit breaking current;
- rated short circuit making current;
- minimum clearances in air between phases and to earth;
- type of closing mechanism;
- whether trip free or fixed trip and with lock-out preventing closing;
- rated supply and /or pressure of closing mechanism; and
- details of any interlocking systems.

A1.2 Transformers

- manufacturer;
- rated voltages and tapping range;
- rating (kVA);
- lightning impulse withstand level;
- vector group symbol;
- insulating medium; and
- type of connections.

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A1.3 Underground Cables

- manufacturer;
- voltage designation;
- number of cores;
- conductor material, size and where applicable, size of reduced neutral conductor;
- type of insulation;
- construction details;
- type of terminations proposed;
- fault withstand rating of core and screen;
- proposed method of installation including mechanical protection; and
- screen earthing details for each end of any incoming supply cable.

A1.4 High Voltage Motors

- manufacturer;
- type of motor and if an induction motor cage or wound rotor;
- rated power (kW or hp);
- rated voltage;
- rated current;
- method of starting to be employed;
- starting torque in terms of the rated load torque and the maximum starting current
- which may be taken from the supply with the starting apparatus in the circuit;
- if thyristor control equipment is proposed, details relating to the harmonic current
- generation is required; and
- frequency of starting.

A1.5 Generators

- manufacturer;
- type of generator;
- rated output;
- rated voltage;
- rated current;
- synchronous, transient and sub transient reactance. (if generator is connected to the supply system through a solid state inverter indicate three phase short circuit current at output side of inverter);
- details of generator neutral earthing;
- type of excitation;
- voltage regulation; and
- speed regulation.

Protect	Protection and Control Equipment			
•	Current Transformers :	- rated transformation ratios;		
		 primary current rating; 		
		 secondary current rating; 		
		 type classification; 		
		 accuracy classification; 		
		 accuracy limit factor; 		
		– rated burden;		
		 rated secondary reference voltage; 		
		 manufacturer serial number(s); 		
		 secondary winding configuration; and 		
		– applicable standard if not to AS 1675.		
•	Voltage Transformers :	 rated transformation ratios; 		
		 rated secondary voltage; 		
		 type classification; 		
		 accuracy classification; 		
		– rated burden;		
		– rated output;		
		 rated voltage factor and duration; 		
		– manufacturer serial number(s);		
		 secondary winding configuration; 		
		– primary connections; and		
		– applicable standard if not to AS 1243.		
•	Protection Relays	– manufacturer;		
		– type; and		
		– settings.		
•	High voltage fuses :	- type;		
		- rated current or reference current; and		

• Battery and battery charger details.

A2 Installation

A1.6

A2.1 Underground Cables

The high voltage underground cables should be installed in accordance with the Electricity Safety (Installations) Regulations and be consistent with the Electricity Safety (Network Assets) Regulations.

After installation and before activation, the cables should be tested in accordance with the relevant industry standards and cleared for service.

In accordance with the Electricity Safety (Installations) Regulations a detailed drawing recording the route, depth of laying and other relevant information should be produced by the customer. This drawing should be available for the use of all persons concerned with future ground openings on the property.

A2.2 Overhead Lines

Overhead lines should be designed and constructed consistent with the Electricity Safety (Network Assets) Regulations.

Unless otherwise set out in the Wiring Rules, current ratings of aerial conductors should be determined in accordance with Energy Supply Association of Australia Limited (ESAA) Document D(b)5 - 1988

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A2.3 Substations

All apparatus should be clearly and uniquely labelled to ensure correct identification by operating and maintenance personnel.

The design of the substation should provide suitable safety clearances and earthing points to allow safe access for maintenance and inspection without the need to de-energise the entire installation. This should be in accordance with the Code of Practice on Electrical Safety for Work on or Near High Voltage Electrical Apparatus (The Blue Book).

A2.4 Energy and Time Impulses

If a Customer wishes to monitor and control energy management equipment, energy and time impulses are available on request from the Meter Provider. The cost of this will be in addition to other costs incurred. The form of pulses provided will be at the discretion of the Meter Provider.

The Distributor will bear no liability under any circumstances for possible malfunctions of the pulsing equipment.

A2.5 Operating Equipment

High Voltage apparatus such as operating sticks, safety earths, gloves and insulating mats shall be made available by the Customer for use by their HV operators in accordance with the Customer's high voltage operating procedure.

A3 High Voltage Earthing

A3.1 Combined Earthing System

The preferred earthing system is the "combined earthing system". A combined earthing system is one where the high voltage and low voltage equipment is earthed to a common terminal bar.

Each substation on the Customer's property should have its own independent earthing system. Where there are multiple substations on the Customer's property it shall be necessary that the earthing systems be connected together by a conductor of the same size as the high voltage earthing conductors.

A3.2 Separate Earthing System

If the requirements of the combined earthing system cannot be met, then a separate earthing system should be installed in accordance with the relevant clauses of the Wiring Rules. If a separate earthing system is installed then the customer should advise the Distributor and provide details of the installation.

A3.3 Other Earthing Requirements

All metallic substation fences, doors or enclosures should be connected to the earthing system and a grading ring should be installed around the substation enclosure in accordance with AS 2067.

Reinforcing in the substation floor or walls should be connected to the common earth terminal bar.

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