Victorian

Service & Installation Rules

Code of Practice for the Connection of Electrical Installations to Distribution Companies Mains 1999

AGL

CITIPOWER

EASTERN energy

Powercor AUSTRALIA

UNITED ENERGY

Foreword

The Service and Installation Rules 1999 have been compiled jointly by AGL Electricity, Citipower Ltd, Eastern Energy Ltd, Powercor Australia Ltd and United Energy Ltd in conjunction with the Office of the Chief Electrical Inspector. These Rules supersede the 1996 edition (blue cover).

This edition of the Service and Installation Rules has been researched thoroughly and developed through a consultation process, with the support of the Office of the Regulator–General.

These Rules are to be used by electrical contractors, licensed electrical mechanics, consulting engineers, architects, customers, distribution company personnel, representative organisations (unions, associations, etc) and other relevant people directly concerned with the connection of electrical installations to the electrical distribution networks of distribution companies in Victoria.

The changes to this new version of the Service and Installation Rules were circulated to a wide range of people, companies and organisations involved in the Victorian Electrical Supply Industry who are required to use these Rules as part of their work. For convenience, throughout the document, a vertical bar has been placed against any amended text.

The Rules require customer electrical installations to comply with distribution companies' electrical supply arrangements, including service cables and consumer's mains, metering, multiple occupancies and high voltage installations.

Words and expressions defined in the 1999 Electricity Safety (Installations) Regulations or successor documents have the same meaning when used in these Rules.

Revisions and amendments of these Rules will be carried out through a process of consultation with customers, electrical contractors, relevant organisations and associations, manufacturers or electrical equipment, distribution companies, consultants, architects and the Office of the Chief Electrical Inspector.

The change process is designed to encourage diversity of technically acceptable materials, products, equipment and work practices that will deliver increased value to the customer, safe connection of electrical installations and increased competition within the Victorian Electricity Supply Industry.

Comments or suggestions for changes to these Rules should be directed in writing to the appropriate person nominated in Clause 1.5 of these Rules.

Derek J Postlethwaite

Derek Postlethwaite

Chairman, Service and Installation Rules Management Committee Victorian Electricity Supply Industry

Note to User

This document has been published by AGL Electricity, Citipower, Eastern Energy, Powercor Australia and United Energy. This document has been compiled using drawings, guidelines and information that comply with 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 the material contained herein to the particular application or purpose of which it is used. Electricity supply publications are revised when necessary by the issue either of revised pages or complete new editions. It is important that users of such publications ascertain that they are in possession of the latest issue.

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Electricity Safety Act 1998

Electricity Safety (Installations) Regulations 1999

Electricity Safety (Network Assets) Regulations 1997

Electricity Safety (Electric Line Clearance) Regulations 1999

Australian Standards (as detailed in Appendix E) – obtainable from Standards Australia

Code of Practice for Electric Line Clearance (Vegetation) 1999.

Code of Practice for Safe Electrical Work 1997 – Low Voltage Electrical Installations.

\+ Distribution Code

\+ Retail Tariff Metering Code

\+ Supply and Sale Code

* Distribution Company's List of Approved Charges

* Specification for Indoor Substation on Customer's Property

* Guide to the Permanent Earthing of Distribution System Assets

* Code of Practice for Overhead Power and Telecommunications In–span Crossings

* Code of Practice on Electrical Safety in the Victorian Electricity Supply Industry (Blue Book)

* Overhead Line Design Manual, Volumes 1 & 2

* Code of Engineering Practice for Shared Use of Poles

Documents marked # are obtainable from the Law Printer Bookshop or Information Victoria Bookshop.

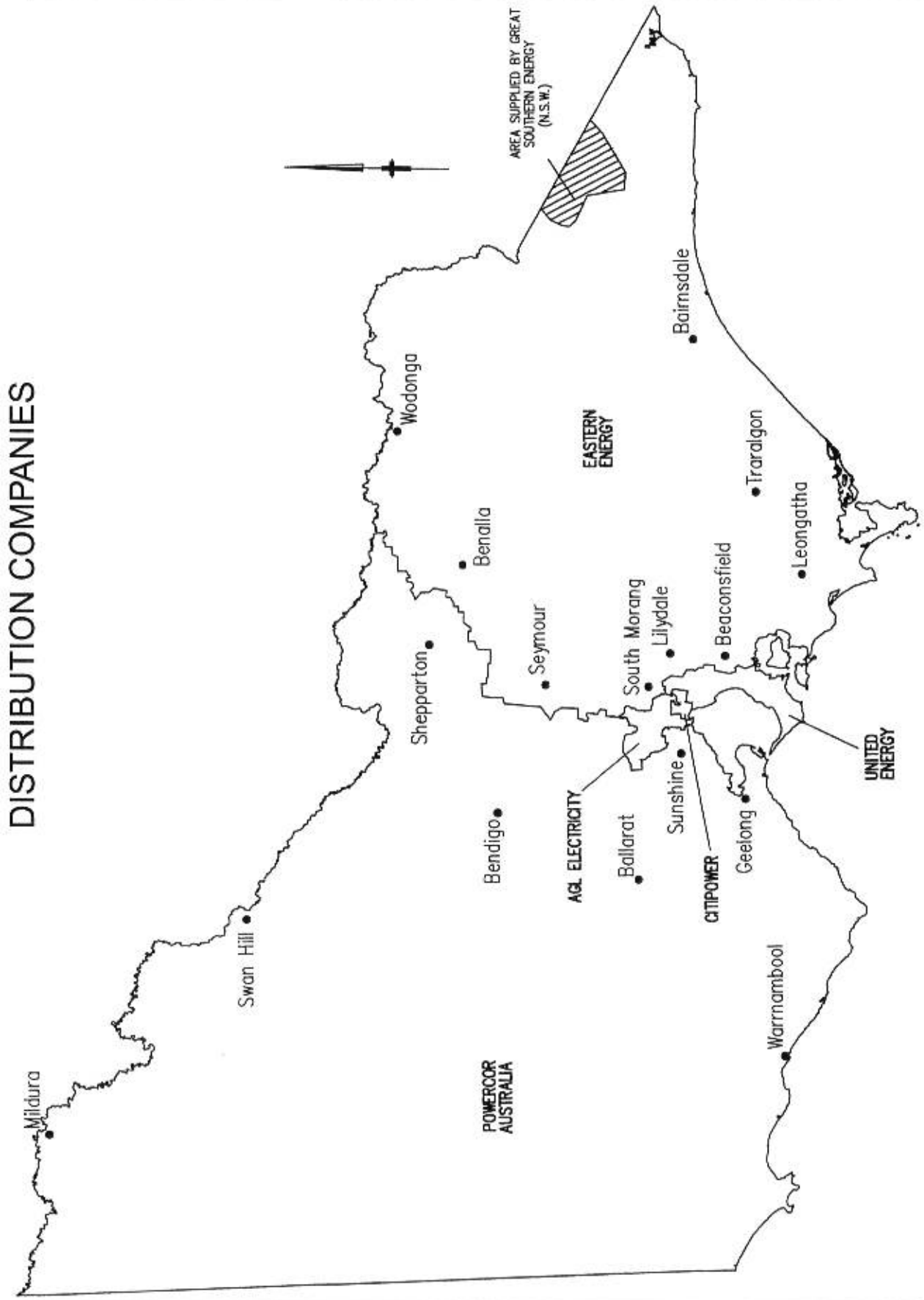
Documents marked + are obtainable from the Office of the Regulator General or the Distribution Companies.

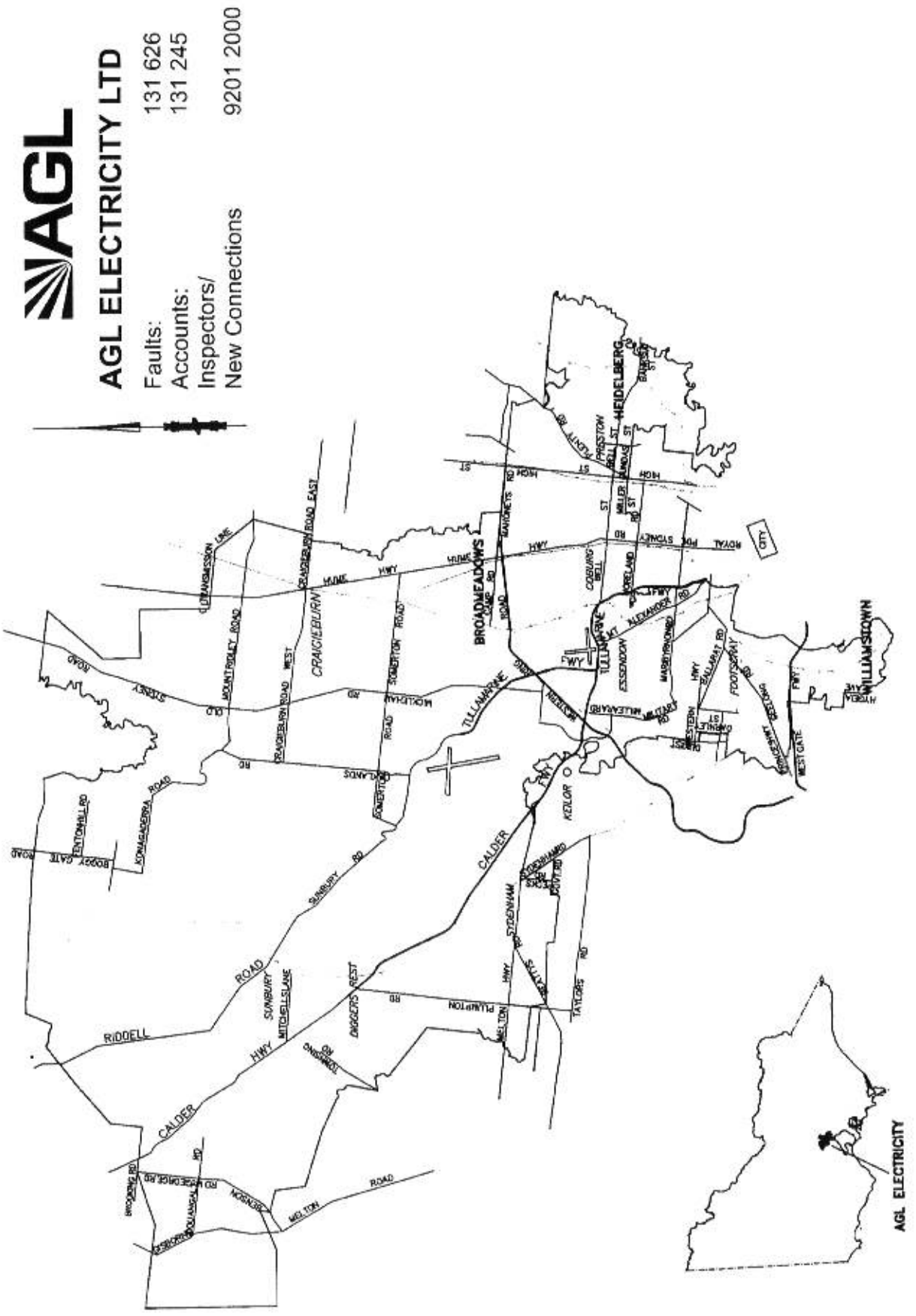
Documents marked * are obtainable from the Distribution Companies.

Areas of Supply

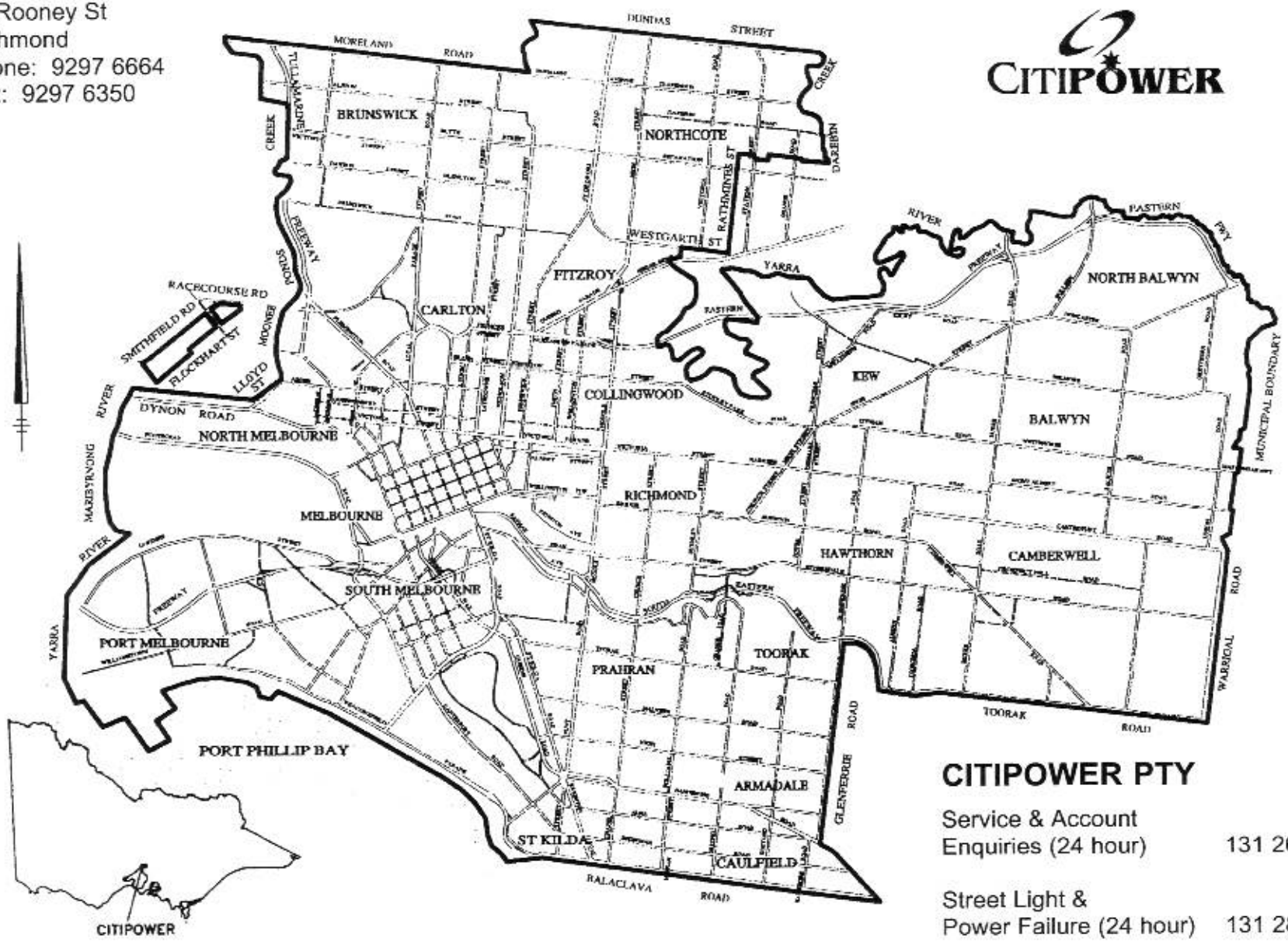
Areas of Supply

Areas of Supply



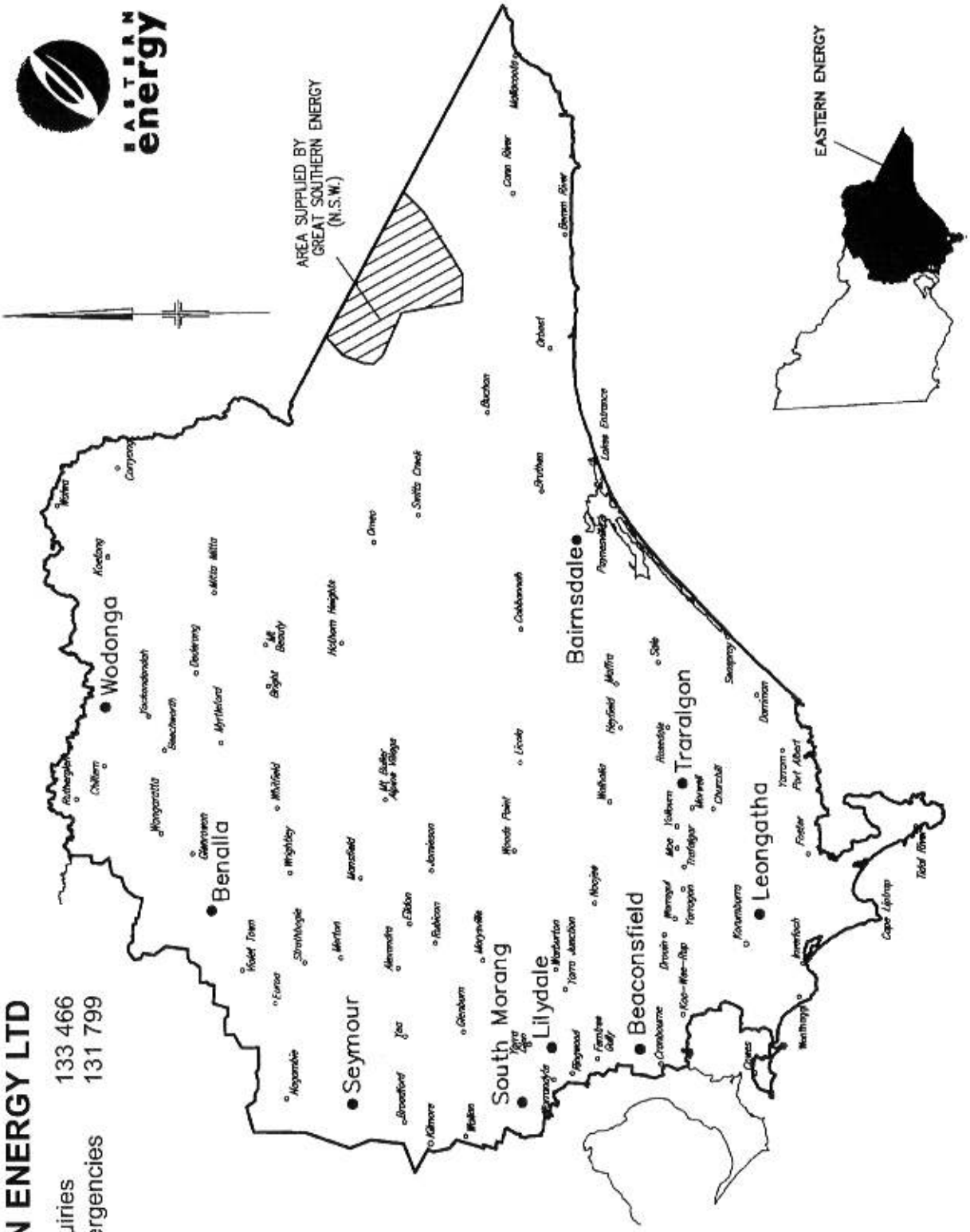


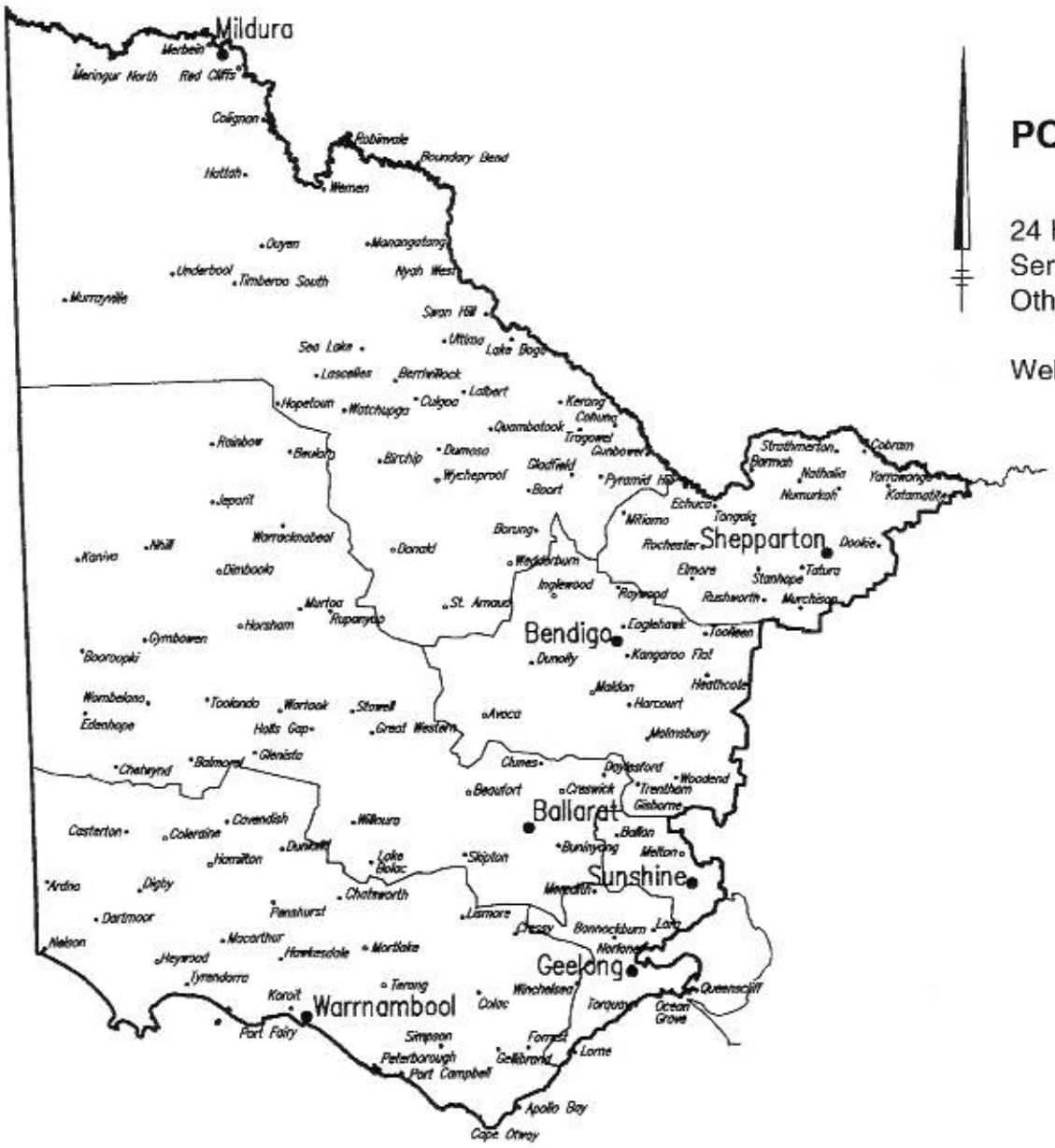
35 Rooney St
Richmond
Phone: 9297 6664
Fax: 9297 6350



CITIPOWER PTY

Service & Account Enquiries (24 hour)	131 260
Street Light & Power Failure (24 hour)	131 280



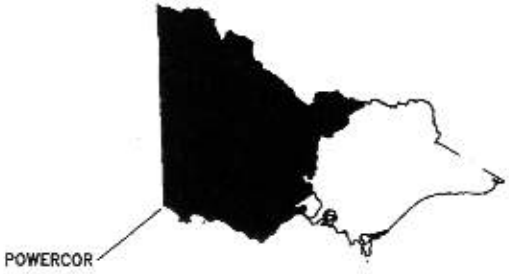


POWERCOR AUST LTD

Powercor AUSTRALIA

24 Hour Customer Call Centre
Service Difficulties and Faults 132 412
Other Network Enquiries 132 206

Website www.powercor.com.au

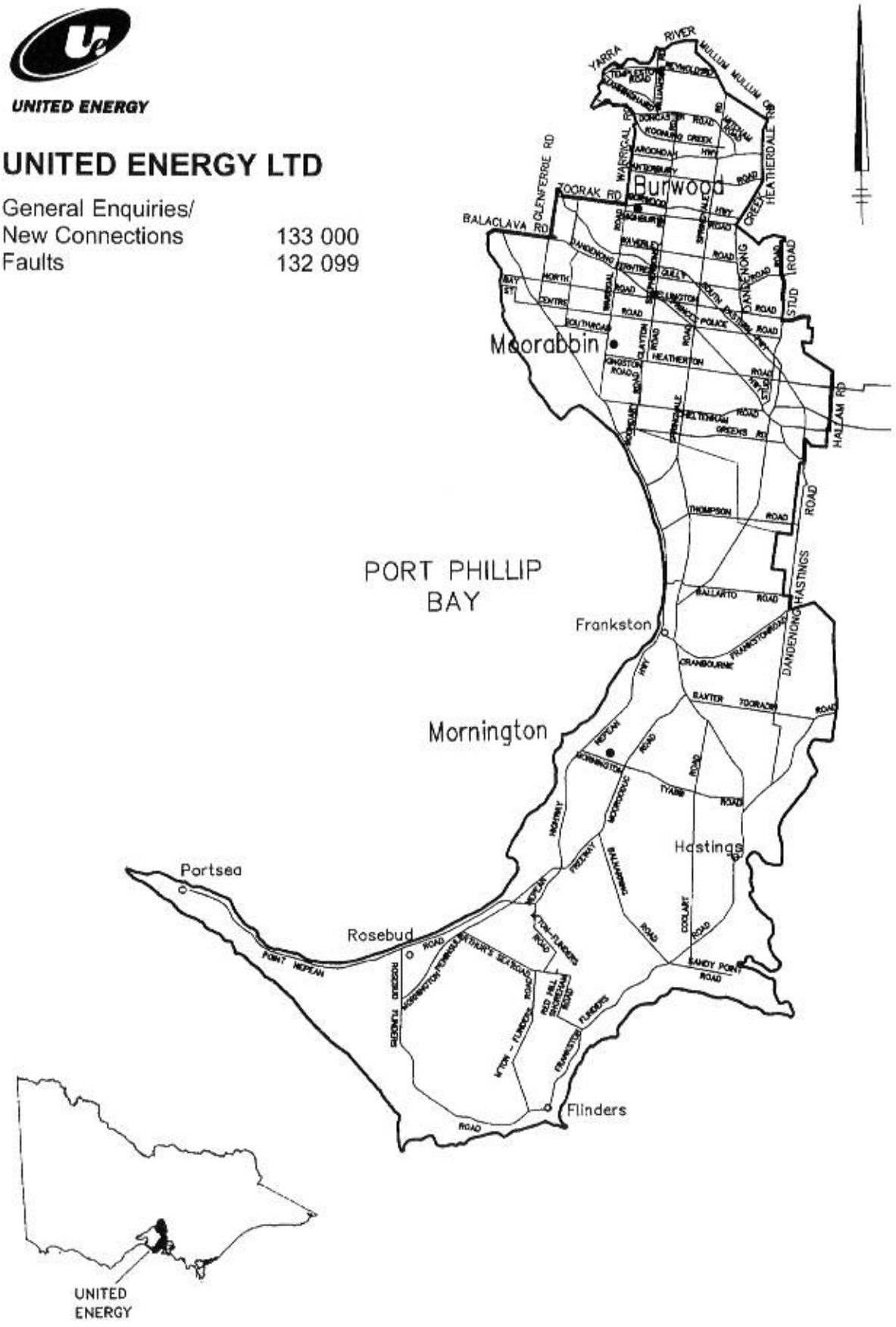


Areas of Supply

UNITED ENERGY

UNITED ENERGY LTD

General Enquiries/	
New Connections	133 000
Faults	132 099



Introductory Information

Introductory Information Contents

A Conditions of Supply

The Supply and Sale Code sets the minimum conditions under which Distributors sell electricity to Franchise Customers.

Non–Franchise Customers are subject to special conditions of supply to be negotiated with the Distributor.

B Tariffs for Supply of Electricity

A Schedule of Electricity Prices is published by each electricity supplier setting out pricing conditions for Franchise Customers. Copies of this schedule are available from your supplier. At all times the customer remains responsible for selecting the particular tariff most appropriate for their requirements.

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

For supply to a new installation, or to an addition to, or alteration of, an existing installation, negotiations should be commenced with the Distributor as soon as the decision to proceed is made. Sufficient time must be allowed for the Distributor to consider, and if necessary alter the existing supply arrangements.

No expense should be incurred by a prospective customer until negotiations for supply have been made 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 installation of the Distributor's equipment on the premises.

Adequate written notice of the customer's requirements should be submitted, particularly where the load is relatively large or the supply is required in a remote location, as considerable time may be necessary for negotiations and construction. In addition the customer may be required to meet the costs involved.

Matters which may affect the design of a building project, such as the determination of the "Point of Supply", the position of the metering and servicing equipment, the point of attachment of an aerial service cable or the point of entry of an underground service cable, and the position of any substation on the premises should be resolved with the Responsible Officer at an early stage of planning.

When contemplating the connection of equipment such as described in Clause 2.6 or 2.7 particular care should be taken to ascertain the Distributor's requirements relating to the prevention of interference with the supply to other customers.

D Application for Connection of Electricity Supply

Application for supply to a new installation or an existing installation should be made to the relevant Distributor or Retailer.

Where the Distributor requires the Franchise Customer to make a written application for connection of electricity to a premises or to provide proof of the Franchise Customer's identity, such proof shall be to the satisfaction of the Distributor.

Non–Franchise Customers are subject to special conditions.

E 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 Officer in Charge, Electrical Licensing, Office of the Chief Electrical Inspector, Level 3, Building 2, 4 Riverside Quay, South Melbourne, 3205. Telephone Freecall 1800 815 721. Facsimile (03) 9686 2197.

General

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Section 1 Contents

1.1 Scope

These Service and Installation Rules, hereafter referred to as "Rules", apply in respect of electricity supply to premises throughout Victoria.

Further detail regarding the matters covered by these Rules is available from the relevant Distributor.

1.2 Definitions

Unless otherwise stated, the terms used in these Rules are as defined in the [Victorian] Electricity Safety Act 1998 and the Electricity Safety (Installations) Regulations 1999. Where any conflict arises, the Act or Regulations take precedence. Current and voltage are expressed as the r.m.s. value.

Aerial Consumers Mains (ACM's) – comprise that portion of the consumers mains erected in the form of a private overhead electric line.

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 Mains – means Consumer's Mains or unmetered Submains which provide supply to a point of distribution for two or more separately metered occupancies

Common Property
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's Terminals – are defined in the Wiring Rules and are the junction of the Distributor's conductors with the Consumer's Mains.

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.

Determined Maximum Demand – means the demand imposed on the Distributor's supply system as assessed by the Responsible Officer. This demand may, but need not necessarily, align with that calculated in accordance with the Electricity Safety (Installations) Regulations for the consumer's mains.

Distribution Code 1999 – means the Electricity Distribution Code certified by the Office of the Regulator–General, the purpose of which is to regulate in a safe, efficient and reliable manner –

- the supply of electricity to or from an electricity supplier's distribution system; and
- the way in which a customer's electrical installation affects the electricity supplier's distribution system to which it is connected.

Distribution Licence – means a licence to distribute and supply electricity granted under Section 162 of the Electricity Industry Act 1993.

Distributor – means a person who holds a Distribution Licence, or who is exempted from holding a licence under Section 162 of the Electricity Industry Act 1993.

The Distribution Company responsible for supply to a particular electrical installation as follows:

(a) AGL Electricity Ltd ACN 064 651 083; or
(b) CitiPower Ltd ACN 064 651 056;
(c) Eastern Energy Limited ACN 064 651 118;
(d) Powercor Australia Limited ACN 064 651 109;
(e) United Energy Ltd ACN 064 651 029.

Also known as Local Service Network Provider (LSNP).

Dual Occupancy

A dual occupancy is the construction of two dwellings on one lot which may be subdivided into two lots each containing a dwelling. The construction of the dwellings does not constitute a subdivision of the lot and they cannot be sold or transferred separately without a subdivision taking place.

Electrical installation – In general, means any electrical equipment that is fixed (or to be fixed) in, on, under or over a Customers premises, but does not include:

(a) upstream of the point of supply;

(b) on land occupied by an electricity supplier that is not used for the consumption of electricity on that land or incidental to that consumption;

(c) comprising of connections to consumers terminals for the purpose of providing electricity supply; or

(d) owned by an electricity supplier for metering or the control or protection of metered or metering circuits.

Note: An electrical installation is specifically defined in the Electricity Safety Act 1998.

Electricity Supplier – means a person who supplies electricity to another person and includes Distributor, Retailer and Metering Provider as the case may require.

Franchise Customer – means a customer other than a Non–Franchised Customer and an Embedded Generator.

LEIW – means Licensed Electrical Installation Worker.

Occupancy – For the purposes of these Rules, an 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 installation.

Point of Supply – In general, "Point of Supply" means the point at which electrical energy is delivered by the Distributor to an electrical installation and at which responsibility for the conveyance of electricity within the property passes from the Distributor to the customer. The Point of Supply is specifically defined in the Electricity Safety Act.

Private Electric Line – For the purposes of these Rules, means any L.V. electric line intended to convey energy from the "Point of Supply" for a property to consuming apparatus within the property, including consumer's mains, sub–mains and final sub–circuits. (Defined in the Electricity Safety Act).

Private Overhead Electric Line (POEL) – comprises all of the LV aerial conductors and all supporting structures, including conductors supported by a catenary wire within an electrical installation for the purpose of taking electrical energy from the point of supply for that installation or distributing electrical energy within that installation.

Property – means a parcel of freehold or leasehold land, or Crown Land held under lease or licence, which may be traversed within its boundaries without crossing a public reserve [including road reserve] or land occupied by a separate person or body.

A single property may include several contiguous titles or leaseholds under the control of a single person or body or it may contain one or more structures or occupancies. Such titles or structures shall be ignored when considering the limits of a single property.

Note: An applicant for supply would be prudent to consider the likely future title holdings as change of ownership may invalidate the arrangement of the installation and thus require expensive modifications. In general, private electric wiring shall not extend beyond the boundary of a property. [Refer to Part 3, Division 4 of the Electricity Safety Act 1998].

'For the purpose of determining the "Point of Supply", where a subdivision comprises lots and common property which provides access to the lots, the Distributor may regard all lots and common property as constituting the one property. Under these circumstances, any common or individual mains or submains leading from the point of supply to lots shall run through the common property and not pass through other lots.'

Land vested in a public authority such as a Municipal Council, other than a road reserve, is regarded as private property for the purpose of these Rules.

Non–franchise Customer – means;

- in relation to the period ending on 31 December 2000, a customer who purchases a load or amount of electricity that exceeds prescribed limits determined in accordance with the Electricity Industry (Non Franchise Customers) Regulation 1995; and
- in relation to the period commencing on 1 January 2001, all customers.

REC – means Registered Electrical Contractor.

Responsible Officer – means the officer appointed by the Distributor and responsible for the administration of requirements detailed in these Rules.

Retailer – means a holder of a Retail Licence, or a person who has been exempted from the requirement to obtain a Retail Licence under Section 160 of the Electricity Industry Act 1993.

Retail Licence – means a licence to sell electricity otherwise than through the Pool granted under Section 162 of the Electricity Industry Act 1993.

Retail Tariff Metering Code 1998 – means the code of that name which:

(a) regulates the basis for installation for new metering equipment and the operating and maintenance of new and existing metering equipment at a franchise customer's supply address;

(b) establishes rights and obligations in respect of metered data; and

(c) has been certified by the Office of the Regulator–General.

Service Cable / Line – means an overhead (aerial) or underground service cable owned and maintained by a Distributor, through which electrical energy is or may be supplied to the point of supply for an electrical installation.

Service Equipment – means Distributor owned equipment including all such equipment installed within the premises of a customer

Service Protection Device – A fuse or circuit breaker fitted in each active conductor of the supply to an installation in accordance with the Electricity Safety (Network Assets) Regulations and which enables disconnection of electricity supply from that installation without affecting supply to other installations or the distribution system under the following conditions:

- where provision for manual disconnection is necessary or desirable; and
- automatically where a short circuit occurs on the load side of the device.

Shall – is to be understood as mandatory.

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

Subdivision

Subdivision means the division of land into two or more parts which can be disposed of separately. (Section 8A of the Sale of Land Act 1962 deals with this matter.)

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

Supply and Sale Code 1997 – means the code of that name which is certified by the Office of the Regulator–General.

Supply Disconnection Device

A Supply Disconnection Device is a fuse or circuit breaker installed in each active conductor of the supply to a single occupancy or group of occupancies within a multiple occupancy installation which provides a means of independent disconnection of supply to the portion of the multiple occupancy installation supplied thereby.

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.

Wiring Rules – means the Australian Standard 3000 – SAA Wiring Rules

1.3 Access to Supply Address

A customer must allow an electricity supplier and its equipment, safe, convenient and unhindered access to the customer's supply address in accordance with the Supply and Sale Code for the following purposes –

- to read the meter at the customer's supply address;
- to connect or disconnect supply;
- to inspect or test the electrical installation at the customer's supply address;
- to undertake repairs, testing, or maintenance of the electricity supplier's distribution system; and
- to prune or clear vegetation from electric lines at the customer's supply address in accordance with the Code of Practice for Electric Line Clearance (Vegetation).

In accordance with the Distribution Code, a customer must provide the Distributor's officer's or agents at all times a safe, convenient and unhindered access to their equipment on the customer's premises for any purposes associated with the supply, metering or billing of electricity or the inspection and/or testing of the customer's electrical installation.

An Electricity Supplier and a customer must comply with the Retail Tariff Metering Code and these Rules.

1.4 Failure to Comply with These Rules

In the event of the customer or REC failing to comply with the requirements of these Rules, the Distributor may refuse to supply the installation or any portion thereof.

1.5 Exceptional Circumstances

In exceptional circumstances the stated requirements contained in these Rules may be waived or modified. Any request in this regard shall be addressed in writing to the Nominated Officer of the Distributor responsible for supply to the particular installation as follows:

Title Manager, Metering Services

Citipower Ltd

Address: Locked Bag 14031 Melbourne City Mail Centre 8001

Title Standards Officer

Eastern Energy Ltd

Address: Locked Bag 14060 Melbourne City Mail Centre 8001

Title : Connections Standards Manager

Powercor Australia Ltd

Address: Locked Bag 14090 Melbourne City Mail Centre 8001

Title: Installations Inspection Co–ordinator

AGL Electricity Ltd

Address: 30–40 King William St Broadmeadows 3047

Title: Customer Operations Manager

United Energy Ltd

Address: Locked Bag 13 Mount Waverley 3149

Every request shall be accompanied by a detailed statement of the reasons why non–compliance with these Rules is sought, together with 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.

1.6 Point of Supply

Where low voltage [L.V.] electricity is provided to a property, the Point of Supply shall be as defined in the Electricity Safety Act. This means the Point of Supply shall normally be one of the following points, as appropriate to the particular property and method of supply:

- an underground cable – at the point at which the cable crosses the boundary of the property.
- an aerial service cable – at the first point of attachment of that service cable within the property.
- a high voltage line and substation within the property – at the L.V. terminals of that substation.

For supplies to properties in existence at 1st July 1992, the Point of Supply on a L.V. line [located on an easement in favour of the Distributor] within the property shall be at the L.V. terminals established on the Distributor line.

The Consumers Terminals may not coincide with the Point of Supply. This will depend upon the practicability of effecting the physical connection of the Distributor's and customers wiring at that point.

Where electricity is provided at other voltages, the Point of Supply shall be determined by the Responsible Officer.

Note: For electricity supply beyond property boundaries, reference should be made to Part 3, Division 4 of the Electricity Safety Act.

1.7 Alterations and Additions

The customer should ascertain that the required supply is available before incurring any expense; as indicated in the introductory information. If an alteration or addition to an existing installation makes it necessary to alter or install additional Distributor equipment, the customer shall make provision for mounting and connection of that equipment in accordance with these Rules and to the satisfaction of the Responsible Officer.

In other cases, arrangements shall be made to the satisfaction of the Responsible Officer, including the provision and installation of the required meter panel/s or Service Protection Devices in accordance with Sections 5 and 6 of these Rules.

Where additions, alterations and/or repairs are carried out on consumers mains or associated terminating devices, the customer may be required to provide a service protection device, which complies with Section 5 of these Rules.

Note: See Clause 3.2 regarding Charges Applicable.

1.8 Offences

A person, other than a suitably accredited person authorised by the Electricity Supplier to carry out such work, shall not insert or remove a fuse-link of a service protective device, make or break any connection (including seals or locks), dismantle any component part of the Distributor's equipment or detach such equipment from its fixing point.

Obtaining electricity by fraud is theft. 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 and it may also cause that person to have a criminal record.

1.9 Labelling

Every label shall be permanent, indelible and legible and also be suitable for the purpose for which it is intended. For guidance reference should be made to Section 7 "Marking" of AS3100 "Approval and Test Specification – General requirements for Electrical Equipment".

1.10 Victorian Power Industry Lock

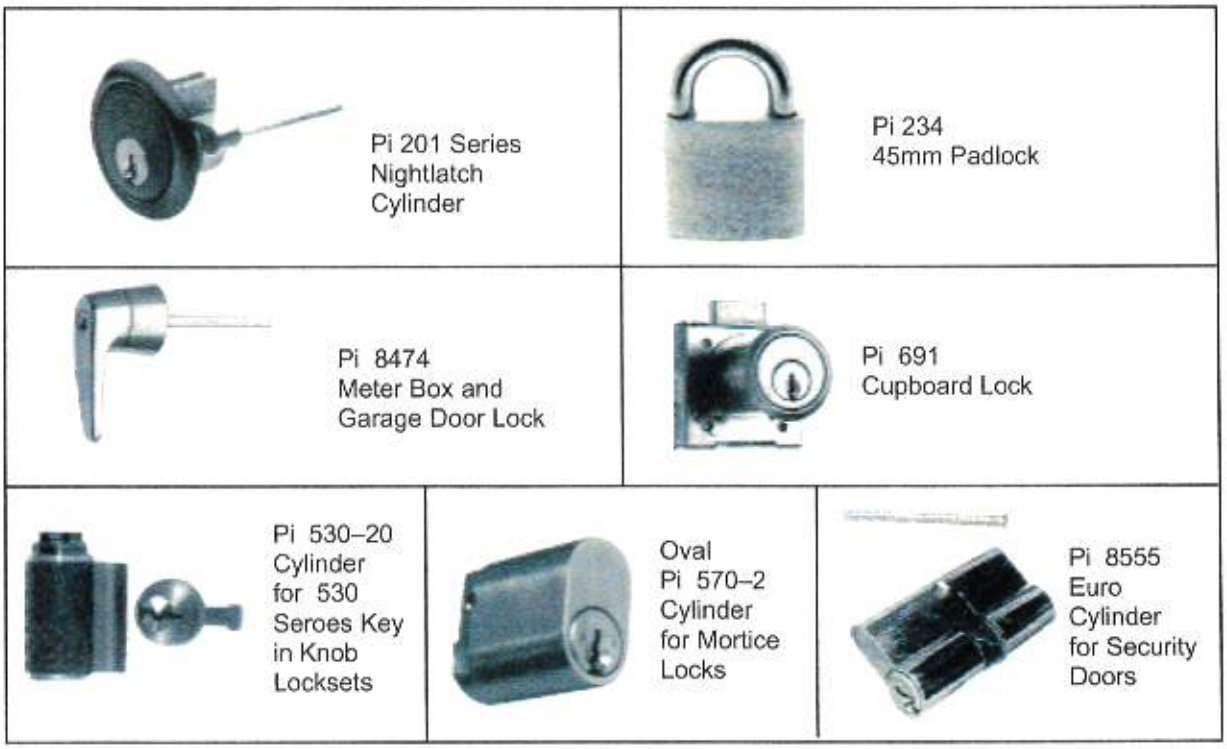
Where a Customer is required to or wishes to install a locking system to doors and enclosures which require dual access by both the Customer and Distributor representatives, it shall be subject to the following conditions:

- The locking system used is a Victorian Power Industry Lock which is available through major retail hardware outlets throughout Victoria. This enables the use of a Master Key by Distributor representatives only. (Further information is available from the Distributor); and
- The locking system is only used where specifically referred to and permitted by these Rules.

Notes:

- Reference should also be made to Clauses 5.4.3.7(a), 6.2.1.1 and 6.4.4.
- Other locks may be keyed to this system but the Master Key will only operate the Power Industry Lock.
- Refer to Figure 1.1 "Victorian Power Industry Locks" for types of locks available.

Examples of Power Industry locks:



Note:

It is a condition of supply that access be available to the electricity distribution companies during business hours for the purpose of reading their meters. If locks are used which restrict access, such as perimeter gates or meter boxes, a "Power Industry" master keyed lock is to be used. These locks are individually keyed and can only be opened by you and your power industry meter reader ensuring your security is maintained.

The benefits of the master key system are:

- No estimated accounts.
- Saves costs of relocating meter if security gate is erected.
- Easier access to read meters.

Locks are available via Master Locksmiths and other hardware outlets throughout Victoria.

Figure 1.1 Victorian Power Industry Locks

Statutory Regulations

2

Section 2 Contents

2.1 General

2.1.1 Safety

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

Notes – Attention is directed to:

- the Electricity Safety Act 1998 and the Regulations and Codes of Practices under jurisdiction of this Act;
- the Code of Practice on Electrical Safety in the Victorian Electricity Supply Industry (Blue Book);
- the Code of Practice for Safe Electrical Work 1997 – Low Voltage Electrical Installations
- the Occupational Health and Safety Act 1985 and the Regulations and Codes of Practices under the jurisdiction of this Act;
- Clause 5.4.1.1 regarding safety aspects for underground cables;
- Clause 5.5.1.4 and 5.5.1.5 regarding clearances of aerial service cables; and
- Clause 8.9 regarding installation of high voltage conductors.

2.1.2 Compliance with Regulations, Codes of Practices and these Rules

Every new installation, alteration of, or addition to an installation to be connected to the Distributor's mains shall comply with the current edition of the Electricity Safety Act and the Regulations and Codes of Practices under jurisdiction of this Act, with these Rules and other relevant Codes of Practices including the:

- Electricity Distribution Code;
- Supply and Sale Code;
- Retail Tariff Metering Code;
- Wholesale Metering Code.

The Distributor may inspect the installation or occupancy to determine compliance with these Rules.

Note: Attention is directed to Section E of the Introductory Information regarding the necessity for employing a licensed person.

2.1.3 Certificate of Electrical Safety

The Electricity Safety Act requires that the person responsible for the work (the "Responsible Person") must arrange for an inspection of prescribed portion/s of any electrical installation work prior to such portion/s being first used after completion of the work. The "Responsible Person" is usually a Registered Electrical Contractor but may be another.

To satisfy this requirement, prescribed electrical installation work must be inspected by a Licensed Electrical Inspector and a Certificate of Electrical Safety for the installation endorsed as complying with the Act and the Regulations.

This applies regardless of whether the work is part of a new installation or an alteration of or addition to an existing installation and relates to the requirements of the Electrical Safety (Installations) Regulations. Compliance with these rules is not part of that process.

The Distributor must ensure a Certificate of Electrical Safety has been issued prior to first connecting an installation or occupancy containing prescribed work to supply.

Where installations and occupancies are connected to supply, the "Responsible Person" performing prescribed work must ensure the work is inspected and a Certificate of Electrical Safety completed prior to connection of such work to supply.

It is the "Responsible Person's" responsibility in all cases to arrange the inspection and completion of a Certificate of Electrical Safety, and to provide a Copy of the Certificate to the Customer and the Office of the Chief Electrical Inspector.

2.1.4 Testing

The Licenced Electrical Installation Worker who carries out electrical installation work shall perform all necessary tests and ensure that the work complies with the requirements of the Electricity Safety (Installations) Regulations.

Note: Reference should be made to AS 3017 – Electrical Installations – Testing Guidelines.

2.1.5 Polarity Testing

Where supply is available, tests should be carried out to:

- prove correct supply polarity, and
- prove neutral conductors are connected to the supply neutral at all points

Refer Appendix C for a suitable guide for carrying out polarity testing for supply to installations.

2.2 Notification

2.2.1 General

To ensure timely connection of an adequate electricity supply, the Distributor requires advance notification of work required to be performed by the Distributor to make electricity supply available to an installation or occupancy.

Notification must be provided:

- well in advance of the required connection date for all new installation or occupancy connections, alterations and additions to existing installations or occupancies where sufficient supply may not be available, or where minor line of mains work such as a supply pit needs to be installed; and
- notice prior to the required connection time for all new installation or occupancy connections and alterations and additions to existing installations or occupancies which will require the Distributors involvement, affect the distribution network or network assets, or will affect the electrical metering of an installation or occupancy.

A pro forma 'Electrical Work Request' ("Electrical Work Advice" in Powercor Australia's area) is available from each Distributor. An Electrical Work Request must be completed and submitted to the relevant Distributor as early as practicable in advance of the need for work to be performed by the Distributor.

For new installations and alterations to existing installations where prescribed work has been carried out, the Distributor is required to ensure a Certificate of Electrical Safety has been issued prior to first connecting the work to supply.

Individual "Distributor's Notification of Electrical Work Guidelines" may be obtained from the appropriate enquires contact numbers detailed on pages AS–2 to AS–6.

As detailed in Clause 2.1.3 above, in all cases the responsibility to arrange for an electrical safety inspection and the issue of a Certificate of Electrical Safety rests with the "Responsible Person".

2.2.2 Compliance with these Rules

Should the installation not satisfy these rules, connection of electricity supply may be delayed until such time as the offending matter has been rectified.

Re–inspection of a failure to comply with these rules may be undertaken by the Distributor and an Approved Charge for this service may apply. Refer Clause 3.2

Refer also to the 'Standard of Approved Charges' of the relevant Distributor for current fees.

2.2.3 Re–Connection of Installations with Defects or Off Supply Over 12 Months

For premises that have been disconnected from supply for a period of 12 months or longer or have identified defects, the relevant Distributor will require certified evidence that the installation is safe to reconnect by the Distributor.

An installation check by, and a signed letter or notice stating that the installation is safe to connect from a LEIW or Licensed Electrical Inspector is acceptable as certified evidence, and must be received prior to reconnection.

In addition, reconnection of installations which have identified defects are subject to any repairs, notification and processes required by the Electricity Safety Act and the Electricity Safety (Installations) Regulations.

2.3 Voltage Drop

The voltage drop from the Consumer's Terminals to any point on the installation shall be calculated in accordance with the requirements of the Electricity Safety (Installations) Regulations.

Note: Attention is drawn to Clause 5.3.2 regarding minimum loading of Consumer's Mains.

2.4 Earthing

Unless otherwise approved by the Office of the Chief Electrical Inspector, all installations required to be earthed shall conform to the requirements for the Multiple Earthed Neutral (MEN) System of Earthing as detailed in the Wiring Rules.

2.5 Power Factor

Unless otherwise agreed with the Distributor, a customer must maintain the Power Factor of the electrical installation in accordance with the Distribution Code

2.6 Interference with Supply to Other Customers

2.6.1 General

If, in the opinion of the 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 premises. 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.

2.6.2 Equipment Requiring Special Consideration

The Distributor may refuse to permit or apply conditions 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 would cause excessive fluctuation of voltage on the Distributor's system as a result of its large or fluctuating demand, e.g. arc furnaces, welding machines, X–ray units, frequently–started large motors, etc.

(b) Equipment which would 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 preliminary application has been made to the Distributor and advice has been received that the supply will be given and upon what terms and conditions it will be given.

Notes:

- The Distribution Code lists specific requirements for negative sequence voltage, harmonic voltage levels, disturbing loads, current harmonics and inductive interference.
- Further information regarding general limits may be obtained from Australian Standard 2279 and AS/NZS 61000.3, "Disturbances in Mains Supply Networks", however, in the case of item (b) above, individual customers are limited to one third of the general limit.
- Refer to Appendix D for Quality of Supply information.

2.6.3 Rectifiers

Alternating to direct current rectifying equipment shall not be connected to the Distributor's system unless–

(a) the rectifier is of the full–wave type; or

(b) a double–wound transformer is interposed between the rectifier and the supply system; or

(c) the rectifier is used in conjunction with an electrical measuring instrument or in similar applications where the rectified current does not exceed 100 milli amperes.

2.6.4 Switching of Apparatus

Individually switched loads rated in excess of the value specified below shall not be connected between an active and the neutral conductor unless the approval of the Responsible Officer has first been obtained. Particular attention should be paid to Section C of the Introductory Information and Clause 2.6.1.

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

2.7 Starting Current of Motors

2.7.1 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 2.2 and Table 2.3 when measured by the methods outlined in Clause 2.7.2.

2.7.1.1 Three Phase Motors 415 Volts

Table 2.1

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
exceeding 3.75 kW	(a) I = (kW x 3.5) + 53 Amperes, or
	(b) I= total kW of motors installed x 1.1 Amperes, or
	(c) I = the starting current of the largest of the other motors installed calculated in accordance with sub–clause (a), whichever is the greatest.

The kW output of motors installed refers to the motors connected to the particular 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 installations which are supplied directly from a substation or where special supply conditions exist, starting currents in excess of those set out in (b) and (c) above may be permitted if permission has been obtained from the Responsible Officer.

2.7.1.2 Single Phase Motors

Table 2.2

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

2.7.2 Test Method of Measurement of Motor Starting Current

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

(a) 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)
- 0.1 + 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.

(b) 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.

Charges and Tariffs

3

Section 3 Contents

3.1 Agreement to Pay Charges

Where the customer is required to pay a charge for work carried out by the Distributor, the customer shall, if requested, sign an agreement in a form acceptable to the Distributor, before the work is commenced.

The customer may be required to pay in advance of the commencement of works.

A copy of the Approved Charges is available from the Distributor on request. Refer to Areas of Supply section for Distributors telephone numbers.

Note: Attention is drawn to Sections B and C of the Introductory Information regarding tariffs for supply of electricity and warning against premature expenditure by a customer.

3.2 Charges Applicable

In general, the customer will be required to pay, in accordance with the Approved Charges as determined by the Distributor in respect of the provision of service and/or metering equipment in certain circumstances. Some examples of these charges are as follows, 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;
- the Distributor provides a service protection device in accordance with Clause 5.2;
- an underground service cable is installed within the customer's premises;
- work is requested to be performed outside normal hours; and
- where the customer fails to complete essential preparations or causes excessive delay after arrival of a service truck.

Charges for Distributor work are the responsibility of the person requesting the work, unless alternative arrangements are made.

The customer shall pay all costs involved in any alteration to the supply arrangements which may be required as a result of failure of the customer to comply with these Rules and the conditions under which the supply is made available.

3.3 Load Control Equipment

3.3.1 Prescribed Hours Tariffs (eg. Off Peak Storage – Water or Space Heating)

Where, in accordance with the provisions of a tariff published by the Distributor, electricity is to be supplied only during certain hours, the Distributor will normally provide and install a 240 Volt control device having a rating up to 30 Amperes. Refer to Figures in Section 6 for wiring diagrams.

Where the controlled load exceeds the capacity of the control device, the customer shall supply and install a suitable contactor installed in accordance with the Electricity Safety (Installations) Regulations and in a position approved by the Responsible Officer. The

contactor will be operated by the Distributor's control device. Refer to Figure 6.20 and / or 6.21 for the appropriate prescribed hours load control wiring diagram.

Unless otherwise approved, booster circuits supplied from the off–peak meter are restricted to water heaters used solely for household drinking or washing purposes.

3.3.2 Time–Of–Use (L.V.) Energy Tariffs

A Time–of–Use Energy tariff is where electricity is supplied continuously at different prices during certain hours in accordance with an approved tariff.

The Distributor may in some situations, be able to provide and install at the customer's request and expense, a 240 Volt control device called a "Switching Service", having a rating up to 30 Amperes for control of the customer's apparatus. Refer to the Responsible Officer for details regarding a "Switching Service". (refer Figure 3.1)

3.3.3 Demand Tariffs

Time and energy pulses for the control of Energy Management Systems may be available on a chargeable basis to customers taking supply under a maximum or contract demand type tariff. Customers will be advised of specific services available and the costs involved on request to the Distributor.

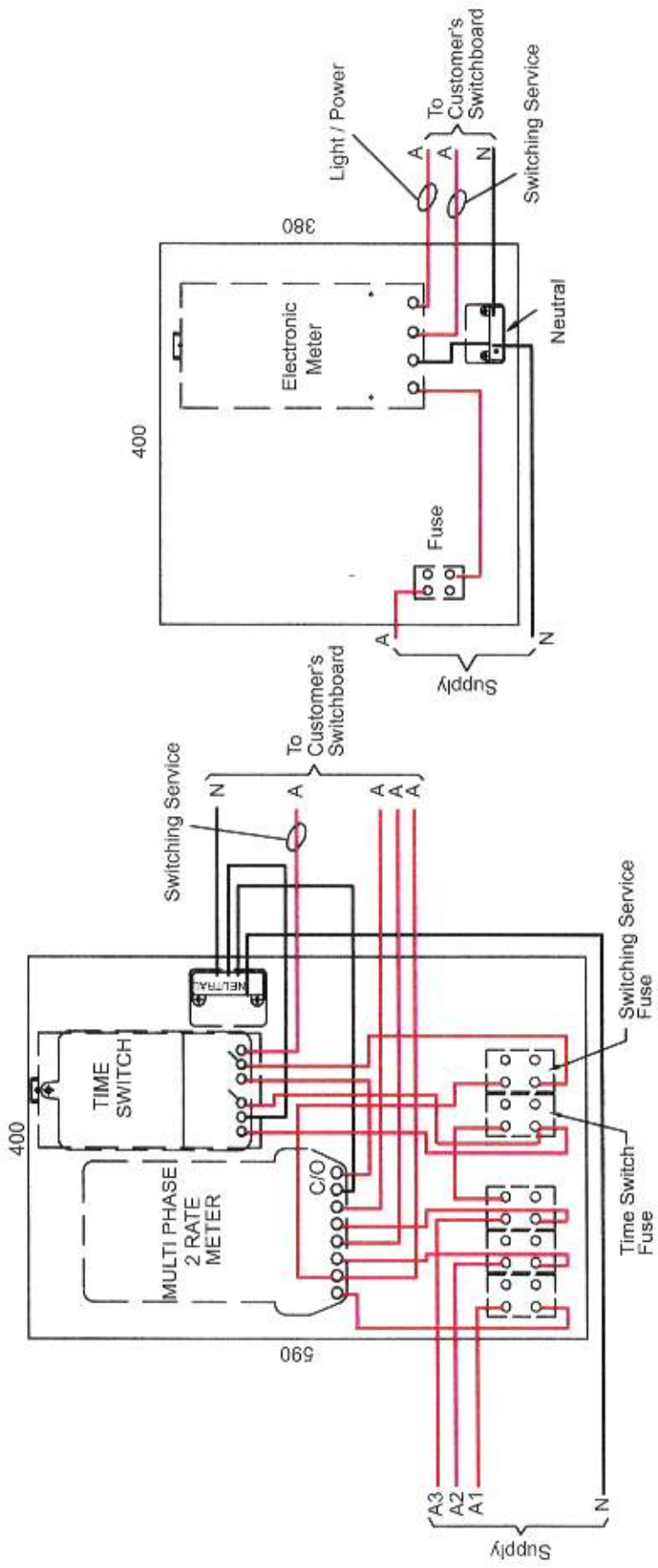


Figure 3.1 Typical Arrangement for Customer's Switching Service

Notes

1. Meter panel fuses are not required for an overhead supply.
2. All time switch wiring and metering neutrals to a minimum of 2.5 mm^2 stranded conductors.
   Refer to Clause 6.6.2 for load carrying conductors.
3. Time Switch and Switching Service fuses are required for all installations other than domestic.
4. Maximum load of time switch contacts 30A.
   For switching loads exceeding 30A refer Fig. 6.21.

Supply Arrangements

4

Section 4 Contents

Section 4 Contents

4.1 System of Supply

The electricity supplied throughout Victoria is in the form of alternating current of approximately sinusoidal waveform at a frequency of 50 Hz. Short term frequency excursions may occur. The nominal supply voltage is 415/240 V from a 3–phase 4–wire system. In some rural areas, the supply may be a single phase 240 V 2–wire or 480/240 V 3–wire system. Supply may also be available at high voltage.

The Distributor may superimpose control signals on the normal supply voltage.

Note: The Distributor endeavours to maintain the voltage at the Point of Supply in accordance with the Distribution Code. Customers are advised to install protective equipment to limit possible damage to their installation or equipment which may be sensitive to voltage variation, transients or loss of one or more phases of supply.

Refer to Appendix D for Quality of Supply information.

Refer to Section 8 for information pertaining to Customer's High Voltage Installations

4.2 Supply System Earthing

The neutral conductor of the low voltage supply system is solidly earthed. Unless otherwise advised, the Multiple Earthed Neutral (MEN) system is used.

4.3 Prospective Fault Current

The customer shall provide protective devices having an interrupting capacity adequate for the prospective short circuit current at the customer's main switchboard or at any other point within the installation as required by the Electricity Safety (Installations) Regulations.

To meet the requirements of the Electricity Safety (Installations) Regulations, the installation must be designed to withstand, without damage, the maximum currents which may occur under fault conditions such as a short circuit.

The prospective short circuit current varies throughout the distribution system.

Where supply is provided in a residential underground reticulated distribution mains area, the prospective fault current at the consumers terminals shall be deemed to be 3000 amperes single phase and 6000 amperes three phase symmetrical.

In other locations, the magnitude of the prospective fault current that is available at the consumers terminals may be obtained, upon written request, from the Distributor.

Note: Protective devices controlling outgoing circuits on the customer's main switchboard shall be so selected and arranged that they will interrupt the fault current rapidly enough to avoid, as far as practicable, loss of mains supply.

4.4 Number of Supplies

4.4.1 General

For the purposes of this Clause "a supply" means the establishment of a Point of Supply as detailed in Clause 1.6.

The Distributor, under normal conditions, will provide only one supply to each property. However, where it would not be necessary for the Distributor to carry out augmentation

works solely to provide for an additional supply, more than one supply may be provided to a property in the following circumstances -

(a) separate supply may be given to separate individual structures for different customers on the one property under the arrangement for dual occupancy or if each structure and/or vacant lot has a direct frontage and access to a public road or a Distributor easement; or

(b) subject to the approval of the Responsible Officer, where the magnitude of the customers' load and/or the distance separating the relevant electrical installations, having regard to the type of customer's activities and site conditions, is such that it would be sound engineering practice to provide more than one supply.

The provision in (a) above caters for a multi-unit development where the lots all front to a public road or for free standing buildings on separate allotments abutting a public road.

Typical arrangements for number of supplies are shown in Figure 4.1.

In other exceptional circumstances, as determined by engineering considerations, the Distributor may agree to a customer's written request for the provision of a special or additional supply.

The customer may be required to pay the cost involved in providing an additional supply. Before commencement of work, the Distributor must be consulted regarding costs associated with the supply of electricity.

Note: No 'service cable' will be provided where a substation is located on the customer's property as the customer is responsible for all wiring from the substation terminals. See Clause 1.6 - "Point of supply".

4.4.2 Segregation of Supplies - Guidelines

The following guidelines may assist where, in accordance with the provisions of Clause 4.4.1, more than one supply is provided to a premise or property.

- The resultant installation connected to each supply must comply with the Electricity Safety Act and Electricity Safety (Installations) Regulations.
- Each supply and installation should be contained to a *separate and clearly defined portion of the premise or property* without intermixture of equipment connected to each installation.
- *Separate and clearly defined portions of a premise or property* may be separate individual structures, or portions defined and readily identifiable from a *map, marking, notices and barriers*.
- *Maps, marking, notices and barriers*
    - Are the responsibility of the customer
    - Should be permanent, legible and up to date at all times
    - Maps, marking and barriers should clearly indicate the defined portions of the premise or property, the installation (wiring and equipment) contained within that portion, and the location of other supplies and installations.
    - Maps should be installed adjacent to each main switchboard and any distribution board supplied from a main switchboard.
    - Notices should be provided at each set of Consumer's terminals to indicate and show the main switchboard supplied from those terminals.

4.5 Number of Installations per Supply

Where more than one set of Consumer's Terminals (i.e. circuit connection to the Distributor's distribution system) is established to provide supply to -

(a) A number of different occupancies; each set of Consumer's Terminals shall be deemed to provide supply to a separate installation and the provisions of Clause 4.4.2 shall apply.

(b) A single occupancy; such an arrangement is deemed to constitute a single installation.

In addition, where arrangements are made to the satisfaction of the Responsible Officer, two sets of Consumer's Terminals may be established for the following situations –

- A substation on a customer's rural property.
- A customer's dedicated underground supply connection pit or pillar.
- Where two occupancies are located within land locked areas, the perimeter of the building is the property boundary and the main switchboard cannot be located in an area accessible to both occupiers.

Where two sets of consumer's terminals for individual occupancies are established at a single point, and each occupancy is deemed to be a separate installation, the requirements relating to individual consumer's mains supplying one occupancy passing through another occupancy are as follows:–

- **Where consumer's mains associated with one installation pass through a separate occupancy, the section of consumer's mains within that occupancy shall be clearly and permanently identified, by means of marking or attached labels, at intervals not exceeding 2.0 m and the main switchboard of any occupancy through which the cables pass shall be clearly marked to indicate that such consumer's mains are not controlled from that switchboard.**
- **Where the installation is, or may be, subject to subdivision other arrangements may be necessary and the Distributor must be contacted.**
- **Reference shall be made to Clause 402 of the Electricity Safety (Installations) Regulations.**

4.6 Sources of Alternative Supply

4.6.1 General

Where the customer installs an alternative source of supply, whether temporary or permanent, such as a standby emergency generator or an uninterruptible power supply, facilities for connection of the alternative source to the electrical installation normally supplied from the Distributor's system shall not be installed unless the proposed arrangements have been agreed to by the Responsible Officer.

Where the system is to operate automatically, a schematic diagram shall be submitted to the Responsible Officer for approval.

4.6.2 Connection of Installation to Alternative Supply Sources

Where the Responsible Officer agrees to the installation of facilities to enable an installation to be disconnected from the Distributor's supply system and connected to a private alternative source, such facilities shall be arranged either directly or by suitable interlocking procedures so that the Distributor's system, service, and metering equipment cannot be energised from such alternative source (refer Figure 4.2).

The interlocking system shall be effective with any associated switchgear door or cover in the open position. A prominent notice shall be fixed on the main switchboard to show that such facilities exist, which sections of the installation they can supply and their point of control.

In addition, 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 installation main switchboard or Distribution Switchboard to which the alternative supply is connected.

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

In general the neutral shall not be switched or broken on the distribution supply side of the M.E.N. connection. Refer also to AS 3010 "Electrical Installations – Supply by Generating Set".

4.6.3 Parallel Generation

Specific requirements apply in respect of any proposal to incorporate parallel generation facilities within an installation such as the Distribution Code and relevant Australian Standards. It is therefore essential that the Distributor be formally consulted before any commitment to proceed is made.

4.7 Distributor Substation on Customer's Premises

4.7.1 Accommodation

A customer who, in respect of an electrical installation, has a determined maximum demand over 100 kVA must, if the Distributor is unable to supply or continue to supply that maximum demand without installing a new substation, arrange the sale or lease to the Distributor the land upon which a new substation can be installed by the Distributor in order to allow the Distributor to satisfy that maximum demand.

If, in the opinion of the Responsible Officer, a substation on the premises is necessary to provide new or additional supply, the requirements will be set out with the offer of specific conditions of supply. These conditions will include the following –

(a) For pole-mounted type substations, an easement agreement for the supply line will be required. For other substations, the customer shall provide or arrange with the registered proprietor, a lease agreement and easements in favour of the Distributor for adequate space in the premises to accommodate the substation equipment and the supply mains to and from the substation.

(b) A plan to the satisfaction of the Distributor defining the leased area and the easements for access and the ingress and egress of overhead or underground lines shall be prepared by the customer's surveyor.

(c) The customer shall provide any necessary building or enclosure to the satisfaction of the Distributor and provide and maintain suitable arrangements for vehicular access to the substation on a 24 hour basis.

To assist a customer in the planning of an indoor substation, reference should be made to the publication "Specification for Indoor Substation on Customer's Property".

The Distributor has the right to use all substation equipment and to install additional equipment for the purpose of supplying other premises subject to the existing agreed requirements of the customer on whose property the substation is located first being met.

4.7.2 Extension of High Voltage Mains

The Distributor will, subject to the prevailing terms and conditions for extension of the Distributor's system, provide, install and maintain the high voltage mains necessary to connect Distributor's substations on customer's premises abutting the property boundary at a location agreed to by the Distributor. Should the customer require a substation to be located in such a position as to require the extension of the Distributor's high voltage mains within the property and the Distributor agrees to such extension, the customer may be required to meet the costs involved.

4.8 Type of Supply and Conductor Loading

4.8.1 Determination of Number of Phases of Low Voltage Supply

4.8.1.1 Three Phase 415/240 Volt Areas

Individually metered installations having a calculated maximum demand current not exceeding 80 Amperes will normally be given a two–wire supply.

For individually metered installations having a calculated maximum demand current exceeding 80 Amperes, the provision of a two–wire, three–wire or four–wire supply shall be determined by the Responsible Officer.

4.8.1.2 Single Phase 480/240 Volt Areas

The provision of two–wire or three–wire supply shall be determined by the Responsible Officer.

4.8.2 Balancing of Load and Limitation of the Loading of Apparatus

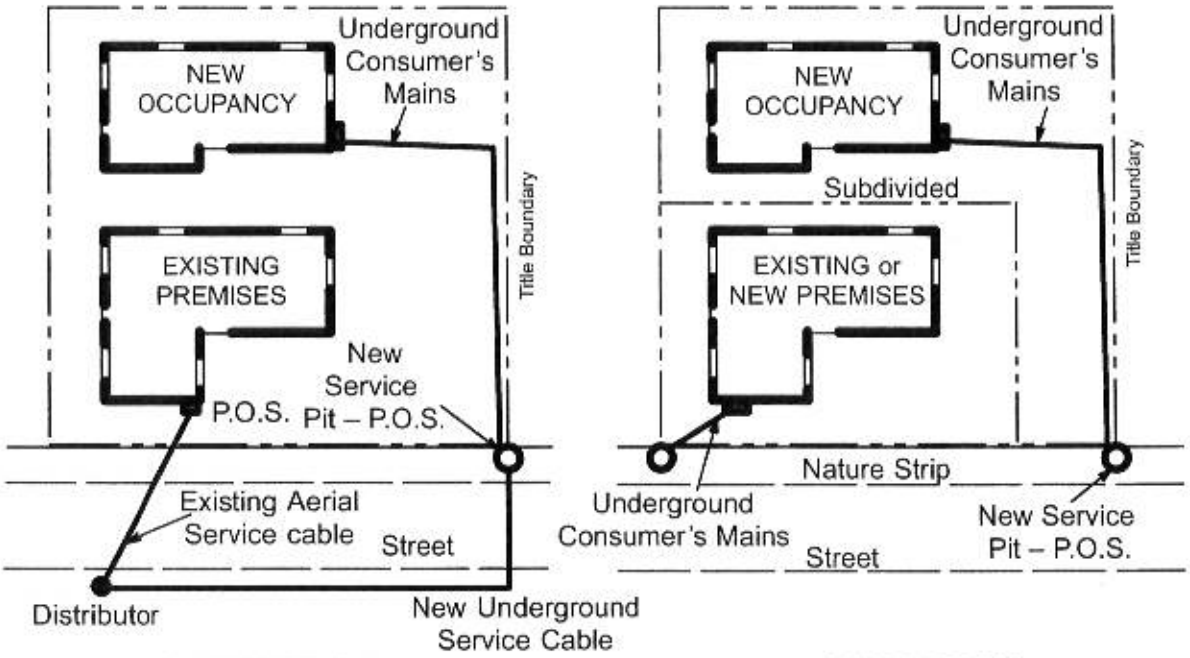
Where a three–wire or four–wire supply is given the load shall be divided as evenly as practicable between the active conductors.

Where an installation is supplied by an aerial or underground service cable having more than one active conductor, the load shall be so arranged that the current in any active supply conductor shall not exceed the current in any other active supply conductor by more than 25 Amperes or 10% whichever is the greater.

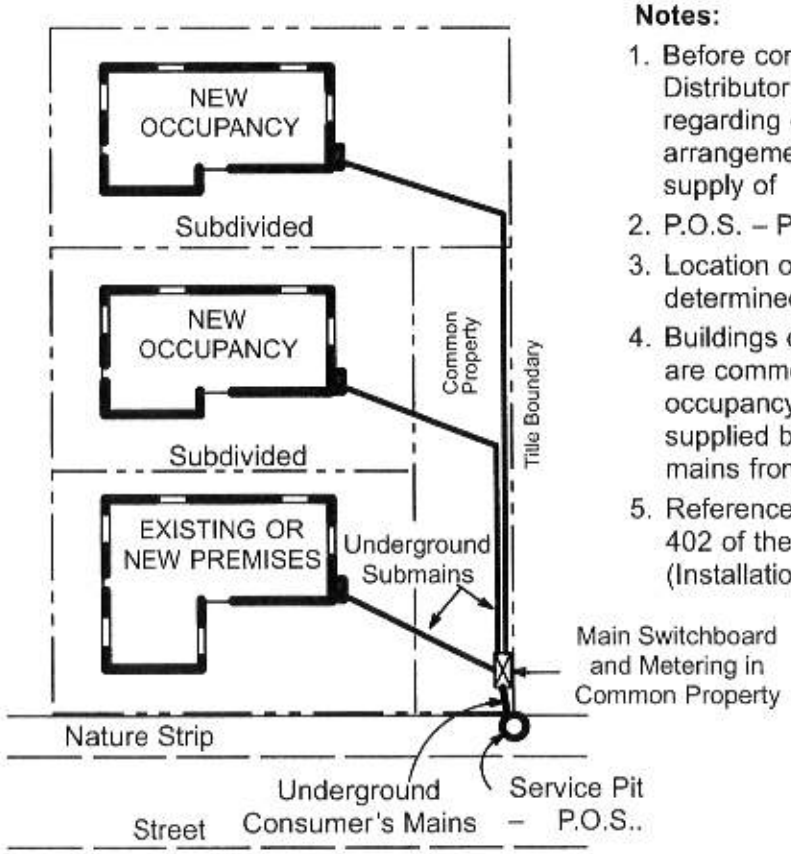
Where the actual load is not known, the arrangement of the load may be determined on the basis of a Calculated Maximum Demand as set out in the Electricity Safety (Installations) Regulations.

To facilitate balancing, apparatus incorporating a 240 Volt loading should generally be provided with one active terminal for a load up to 25 Amperes and two active terminals suitable for connection to different phases where the total load exceeds 25 Amperes but does not exceed 50 Amperes. Where three active terminals are provided, the components of loading should be arranged so that the loading on any terminal does not normally exceed that on any other terminal by more than 25 Amperes.

See also Clause 2.6 regarding interference with supply to other customers, including limitation of switching of apparatus, and Clause 2.7 regarding limitation of the starting current of motors.



TYPICAL ARRANGEMENTS FOR TWO LOT SUBDIVISION OR DUAL OCCUPANCY WITH POTENTIAL FOR SUBDIVISION.



TYPICAL ARRANGEMENTS FOR MULTIPLE OCCUPANCY SUBDIVISION

Notes:

1. Before commencement of work the Distributor must be consulted regarding costs and supply arrangements associated with the supply of electricity.
2. P.O.S. – Point of Supply
3. Location of service pit to be determined by the Distributor.
4. Buildings on "battleaxe" lots which are commonly created for dual occupancy subdivision shall be supplied by underground consumer's mains from the Point of Supply.
5. Reference shall be made to Clause 402 of the Electricity Safety (Installations) Regulations.

Figure 4.1 Typical Arrangements for a Number of Supplies

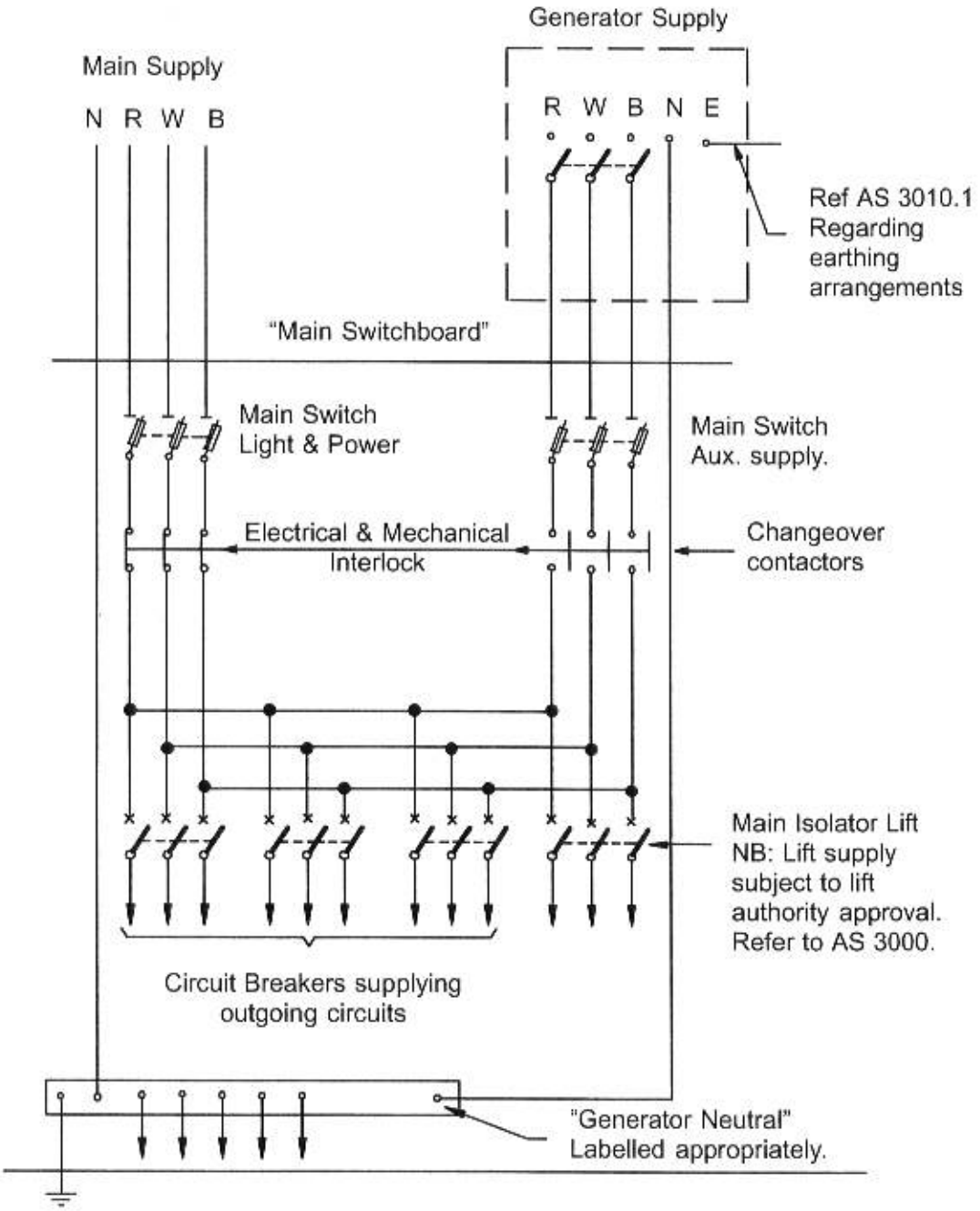


Figure 4.2 Alternative Supply Arrangements (Example Shown)

4.9 Temporary Supplies

4.9.1 General

Where it is not necessary to extend or augment the permanent street mains to make supply available the Distributor. may, subject to the payment of relevant charges, provide a temporary supply in situations where supply to an installation is requested for a limited period. Refer to Approved Charges.

Where it is necessary to extend or augment the permanent street mains to make supply available, the terms and conditions of supply will be subject to negotiation upon receipt of a written request for supply.

The customer should ascertain that a temporary supply could be made available, and of the conditions which would apply before commencement of any works. The Distributor cannot provide a temporary supply unless it is able to energise all the associated Distributor underground or overhead lines.

Where a temporary supply is provided for constructional purposes, it will be disconnected at the time of installation of the permanent service equipment at the premises unless prior arrangements have been made by the temporary supply customer for the retention of such supply and any relevant additional charge paid.

Note: The Electricity Safety (Installations) Regulations stipulate that installations on construction and demolition sites must comply with AS 3012 – Electrical Installations – Construction and Demolition Sites.

4.9.2 Temporary Supply Arrangements

4.9.2.1 Customer's Installation

The customer shall arrange for the supply and installation of an approved meter box, meter panel and, when required, an approved pole. Arrangements shown in Figures 4.3, 4.4, 4.5, 4.6 and 4.7 shall be deemed suitable. Construction of all new meter boxes and switchboard enclosures shall comply with the requirements of Figure 4.6. A service fuse as shown in Figure 4.6 shall be provided where supply is underground.

The electrical installation shall be installed in accordance with the Electricity Safety (Installations) Regulations and adequate protection shall be provided, especially on construction sites, to prevent damage to the Distributor's metering equipment.

Note: Builder's supply poles built prior to the introduction of these Rules and which complied with the previous requirements are acceptable for use, provided they are suitably maintained. It is anticipated that over a period of time, meter boxes complying with previous requirements will be phased out.

4.9.2.2 Method of Supply

In a low bushfire risk area, the Distributor will provide either –

- an aerial service cable to a point up to 20 m inside the property boundary and not further than 45 m from the Distributor pole outside the property (Refer also to Clause 5.5.1); or
- an underground service cable to the property boundary.

In a hazardous bushfire risk area as detailed in the Code of Practice for Electric Line Clearance (Vegetation), and in any case where the street mains are underground, the method of supply under normal conditions shall be by underground service cable to the property boundary.

Where an underground service cable is installed, the customer shall arrange for the supply and installation of the Underground Consumer's Mains in accordance with Clauses 5.3 and 5.4.3.

Use of the permanent consumer's mains to supply the temporary installation is acceptable.

In special circumstances, such as where an Underground Service Cable is not installed, the Responsible Officer may approve the use of an aerial service cable in a hazardous bushfire risk area for a limited period. Unless otherwise agreed by the Responsible Officer this period shall not exceed 12 months.

4.9.2.3 Buildings in Course of Erection

Where an electricity supply is required for constructional purposes, supply may be given when the permanent consumer's mains and metering facilities are installed in their permanent position. The portion of the installation to be connected must be complete and comply with the requirements of the Electricity Safety (Installations) Regulations and the installation notes on Figure 4.7. Typical arrangements are also shown in Figure 4.7

4.10 Public Thoroughfares

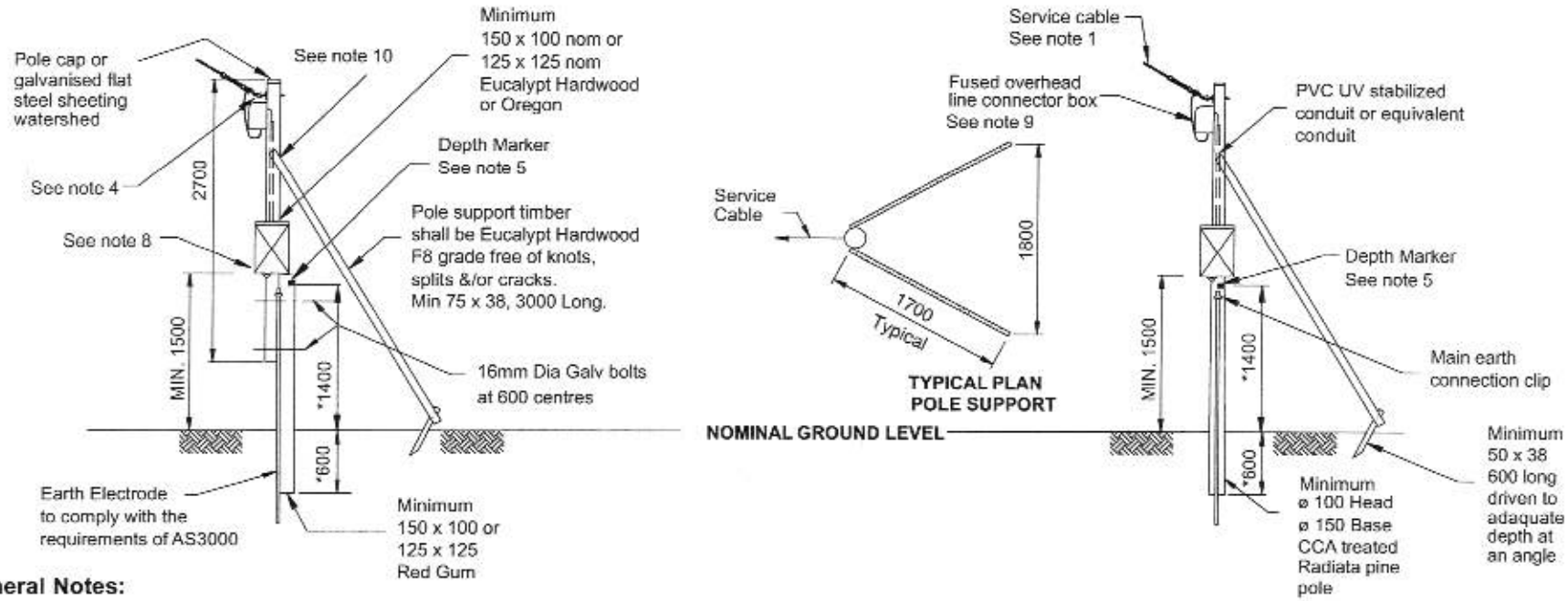
Prior to commencement of an electrical installation on Crown land (or road reserves) the customer shall apply to the relevant governing authority administering the land and the Distributor for approval and applicable conditions.

Where, in special circumstances such as a mobile library, television supply or the like, the Responsible Officer approves a temporary supply provided to a box on a Distributor distribution pole, the installation shall be carried out in accordance with Clause 6.2.5 and the "Code of Engineering Practice for Shared Use of Poles" as appropriate.

The customer shall provide any service protective device required and all necessary materials for connection by the Distributor.

Notes:

- Reference shall be made to the Responsible Officer for installations attached to Tramway Poles.
- For electricity supply beyond property boundaries, reference should be made to Part 3, Division 4 of the Electricity Safety Act.



General Notes:

1. Pole should be positioned to ensure service clearances as set out in Fig. 5.14.
2. These installations are also acceptable for underground distribution provided they are installed in accordance with Figures 4.5 & 4.6 as appropriate.
3. All timber to be well seasoned and of select grade.
4. An approved service bracket shall be provided and installed by customer at a minimum height of 3000mm.
5. A depth marker consisting of a saw cut (minimum length of 100mm) filled by a row of at least three galvanised nails shall be made on the pole at a distance of 2000mm from the base of the pole.
6. The electrical installation shall comply with the Electricity Safety (Installations) Regulations.
7. Excavated soil MUST be compacted around pole in 100mm layers and thoroughly tamped.
8. Main switch to be no higher than 2000mm.
9. The FOLCB must be located and installed on the pole in a manner which enables the easy insertion or removal of the service fuse.
10. Pole supports to be securely attached to pole and pegs using a minimum of 2 – 75mm nails at each fixing point.

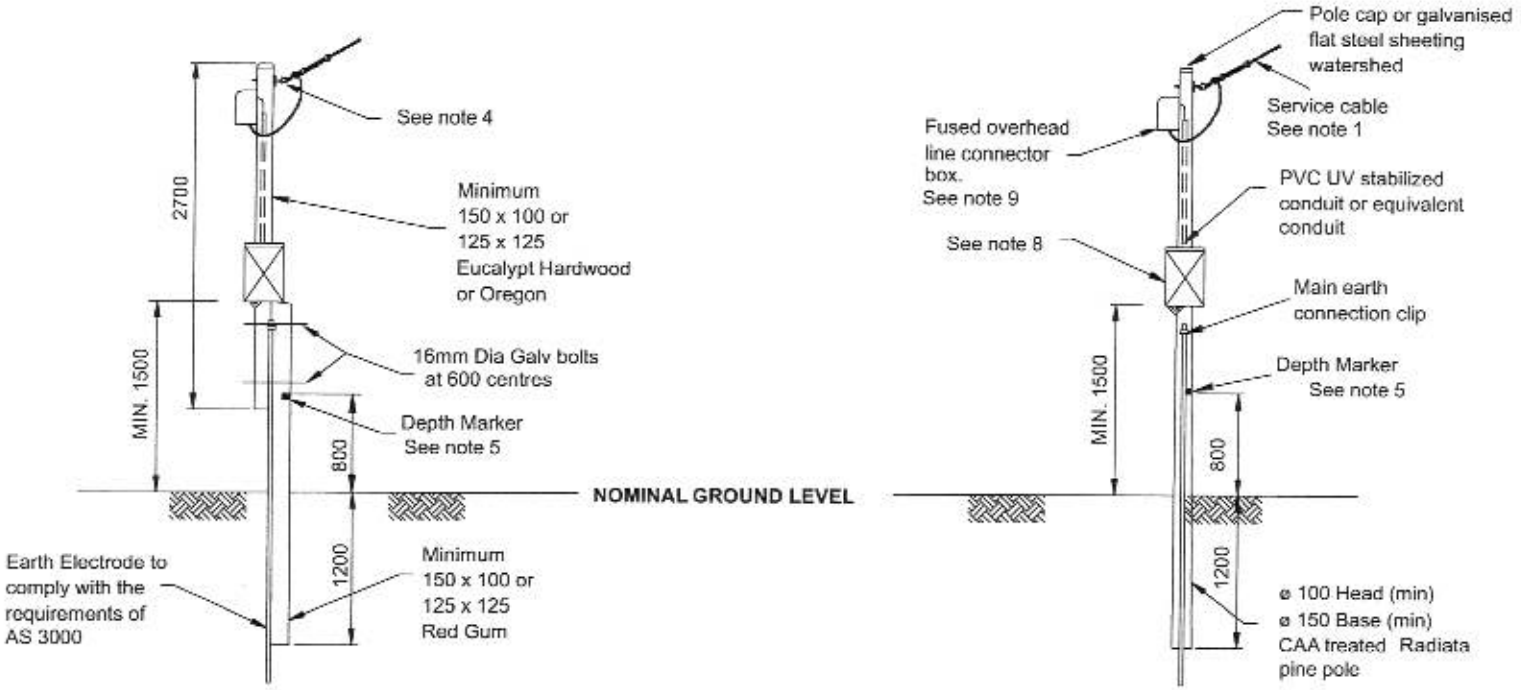
* NOTE: Where footing strength is extremely poor, pole to be installed at a depth of 900mm. ie depth marker at 1100mm above ground level

Alternative Structures:

(a) An alternative arrangement would be to install a pole with 1.2m depth in ground as per Figure 4.4.

(b) Any fabricated alternative arrangement shall be suitably protected against corrosion and be designed to support a load of 2kN at the service bracket. The design shall be carried out by a qualified Structural Engineer or equivalent and shall be submitted to the Distributor for approval.

Figure 4.3 Builders Supply Pole - Alternative 1, 2 Wire Aerial Service



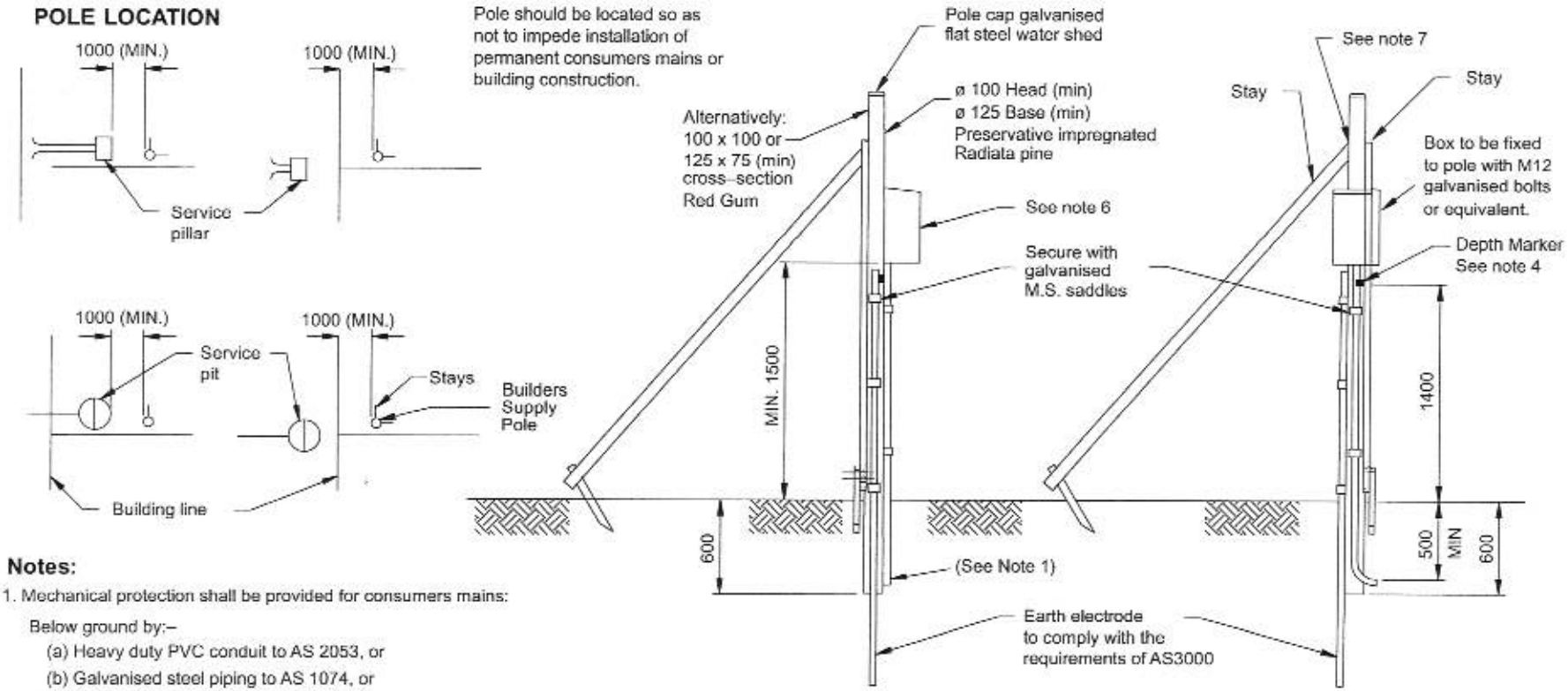
General Notes:

1. Pole should be positioned to ensure service clearances as set out in Fig.5.14.
2. These installations are also acceptable for underground distribution provided they are installed in accordance with Figures 4.5 & 4.6 as appropriate.
3. All timber to be well seasoned and of select grade.
4. An approved service bracket shall be provided and installed by customer at a minimum height of 3000mm.
5. A depth marker consisting of a saw cut (minimum length of 100mm) filled by a row of at least three galvanised nails shall be made on the pole at a distance of 2000mm from the base of the pole.
6. The electrical installation shall comply with the Electricity Safety (Installations) Regulations.
7. Excavated soil MUST be compacted around pole in 100mm layers and thoroughly tamped.
8. Main switch to be no higher than 2000mm.
9. The FOLCB must be located and installed on the pole in a manner which enables the easy insertion or removal of the service fuse.

Alternative Structures:

Any fabricated alternative arrangement shall be suitably protected against corrosion and be designed to support a load of 2kN at the service bracket. The design shall be carried out by a qualified Structural Engineer or equivalent and shall be submitted to the Distributor for approval.

Figure 4.4 Builders Supply Pole - Alternative 2, 2 Wire Aerial Service



Notes:

1. Mechanical protection shall be provided for consumers mains:

   Below ground by:–

   (a) Heavy duty PVC conduit to AS 2053, or

   (b) Galvanised steel piping to AS 1074, or

   (c) Where permitted by Tables 5.2 and 5.3, reinforced concrete cable cover slabs with a minimum thickness of 40mm and a classification of not less than grade 15 to AS 3600. Cover slabs other than concrete may be used subject to specific approval by the Distributor for the purpose. All cover slabs unless light orange in color shall be further identified by the addition of orange marker tape installed in accordance with the Electricity Safety (Installations) Regulations.

   Above ground by:–

   Galvanised steel piping to AS 1074 or approved galvanised steel cable guards in addition to heavy duty PVC conduit to AS 2053 – or other approved equivalent.

2. Pole to Fig. 4.3 and Fig. 4.4 may be used subject to mechanical protection of cable being equivalent to note 1 above.

3. The electrical installation shall comply with the Electricity Safety (Installation) Regulations.

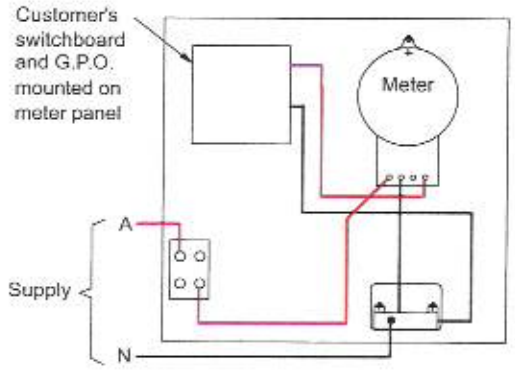
4. A depth marker consisting of a saw cut (minimum length of 100mm) filled by a row of at least three galvanised nails shall be made on the pole at a distance of 2000mm from the base of the pole.

5. Excavated soil MUST be compacted around pole in 100mm layers and thoroughly tamped.

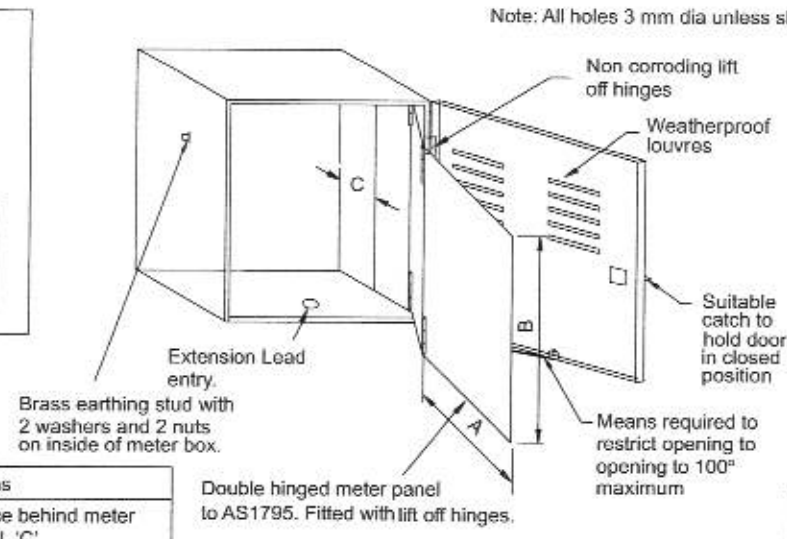
6. Main switch to be no higher than 2000mm.

7. Pole supports to be securely attatched to pole and pegs using a minimum of 2 – 75mm nails at each fixing point.

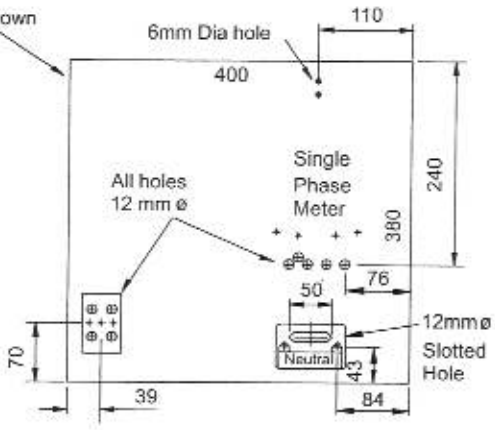
Figure 4.5 Builders Supply Pole – Underground Distribution



WIRING DIAGRAM



ENCLOSURE DETAIL



METER PANEL LAYOUT

Meter Panel Size		Internal Dimensions	
'A'	'B'	Space in front of panel	Space behind meter panel 'C'
400	380	180	75

CAUTION
POWER OUTLETS IN BUILDER'S SUPPLY POLE MUST BE PROTECTED BY RCDs (EARTH LEAKAGE PROTECTION).

Notes:

1. It is not permitted to mount switchboards on meter panels other than for Builder's Supply Poles.
2. Meter box to be constructed of galvanised sheet not less than 1.2 mm thickness. See Clause 6.5.1 for commercially manufactured enclosures.
3. The design and construction of a non–commercially manufactured meter box and panel shall be approved by the Responsible Officer.
4. Provision for sealing is required when the panel is in closed position.
5. Adequate protection to be provided for flexible cords entering meter box against mechanical damage especially when meter box door is closed.
6. Additional reinforcements or bracing may be required to rear of meter box where mounting on a round pole.
7. The meter box shall be constructed having a min. degree of protection of IP 23 to AS1939.
8. The maximum cable size connected to the panel, shall be $16mm^2$.

METER PANEL MATERIALS.
The meter panel as shown must comply with AS1795 Type X or Type Z material.

FUSE
Standard service fuse to be supplied, installed and wired by customer's REC on meter panel, but may be omitted where supply is overhead.

Fuse carrier shall be of a type which accepts a cartridge 57 x 22.2 dia. and is capable of being sealed. (Refer to Clause 6.6.1).

Fuse base must be of a type that will prevent inadvertent personal contact with live parts.

INSTALLATION

The meter must be readily accessible and the metal meter box must be earthed. Meter connections are to be brought through holes provided in meter panel in the sequence from left to right:
Line active (from fuse), meter neutral & Load Active (to switchboard).

NEUTRAL LINK

Neutral link must be 100 A 500 V capacity with a removable cover.

Refer to Clause 6.6.1.

Figure 4.6 Typical Arrangement for Builders Supply Pole Meter & Switchboard Enclosures

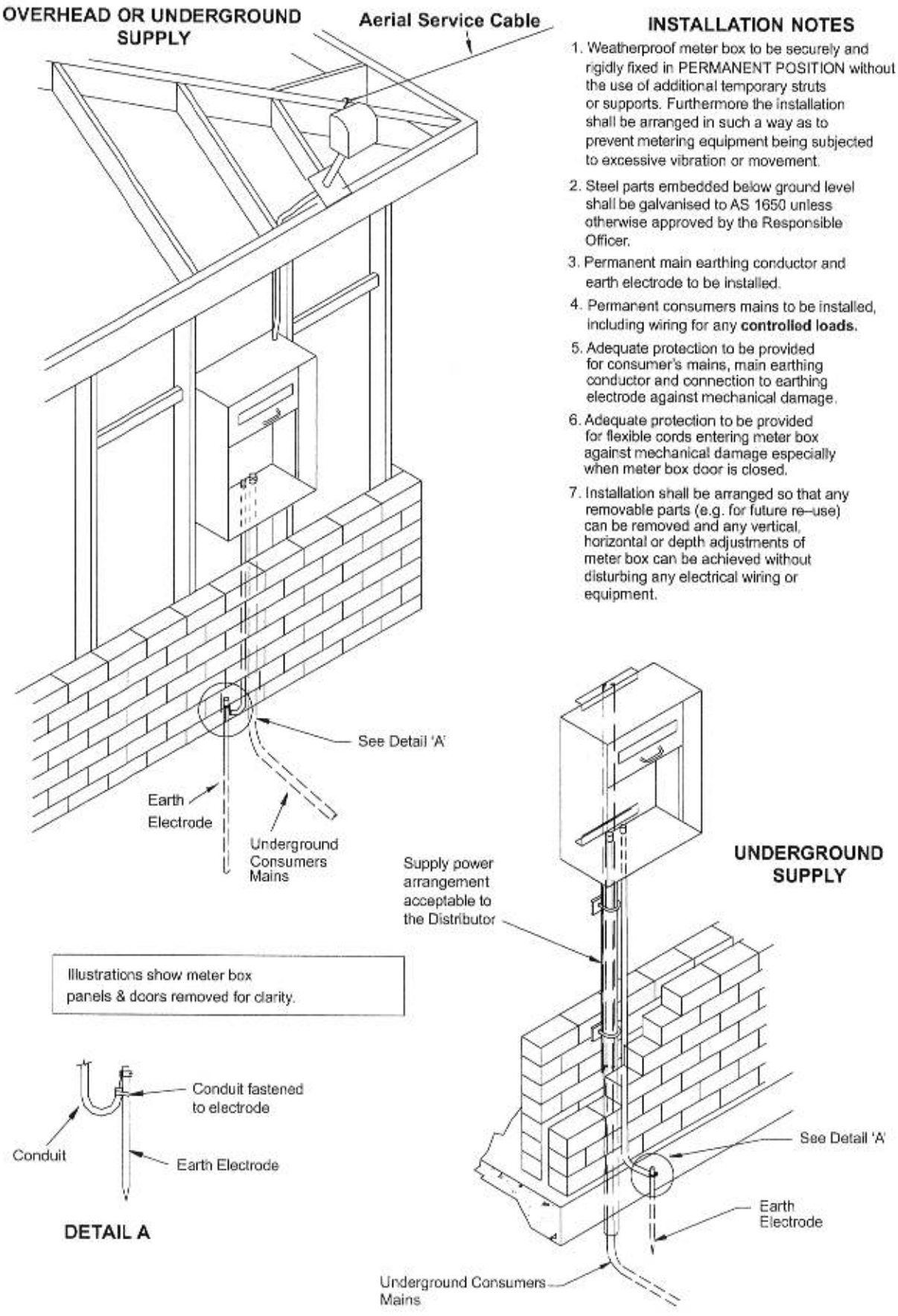


Figure 4.7 Typical Arrangements, Supplies to Buildings in Course of Erection

Service Cables and Consumer's Mains (including Private Overhead Electric Lines)

5

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Service Cables and Consumer's Mains (including Private Overhead Electric Lines)

5.1 Service Cables

5.1.1 General

The customer shall provide adequate mounting and installation facilities for Distributor servicing equipment in the positions approved or selected by the Responsible Officer. Service equipment supplied and installed by the Distributor shall remain the property of the Distributor.

Where supply mains are external to the property, the Distributor will generally install and in all cases will maintain the service cable between its system and the customer's Point of Supply.

However, the Distributor may require the customer to arrange the installation of the service cable and conduits at the customer's expense. In all cases, the Distributor reserves the right to determine the location of the Consumer's Terminals and the method of supply.

In general, private poles for termination of aerial service cables on the customer's property are not permitted. Refer to Clause 5.4.1.4 – Private Pole on Property.

5.1.2 Type of Service Cable

5.1.2.1 Low Bushfire Risk Areas

In low bushfire risk areas as detailed in the Code of Practice for Electric Line Clearance (Vegetation), the service cable from overhead mains may be aerial or underground depending on the nature of the installation and subject to all relevant clearances for an aerial service cable being maintained.

For small subdivisions ("multiple occupancies" refer to Section 7) and "dual occupancies", the service cable will normally be underground to a pit or pillar as detailed in Clause 5.4.1.3. However, in certain cases the Responsible Officer may approve the use of an aerial service.

For larger subdivisions, the Responsible Officer shall be consulted – refer to Section 7.

Where overhead mains exist, a customer may, in general, elect to have an underground in lieu of aerial service cable installed. Refer to Clause 5.4.2.3 – Financial Arrangements.

5.1.2.2 Hazardous Bushfire Risk Areas

In hazardous bushfire risk areas as detailed in the Code of Practice for Electric Line Clearance (Vegetation), the service cable will, in general, be underground, except in the case where a structure can be serviced from the Road Reserve by a single span of aerial service cable in accordance with Clause 5.5.1. The Responsible Officer may approve the use of an aerial service cable where it is not practicable to install an underground service cable (due to obstruction, rock, etc).

Note: See Clauses 1.6, 4.8 and 5.2.4 regarding a substation on a customer's premises. Also refer to Clause 5.5.2 – Aerial Consumers Mains.

5.1.3 Connections to Service Equipment

The customer shall provide sufficient length of cable and suitable means of termination for connection of the consumer's mains to service equipment. In general, aluminium and hard drawn copper conductors are not acceptable for termination directly onto Distributor service

equipment. Copper conductors used shall be multi stranded annealed copper. 25 mm² or larger conductors shall have a minimum of 18 strands.

5.1.4 Special Service Cables

Where a service cable is to be installed in or on a portion of a building (e.g. a shop verandah), the Responsible Officer shall be consulted regarding the location of the Consumer's Terminals and service protection arrangements

5.2. Service Protection Devices

5.2.1 General

5.2.1.1 Introduction

The Electricity Distribution Code includes requirements for customers to use best endeavours to ensure:

(a) protection equipment in the customer's electrical installation is at all time 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.

In addition, Regulations made under the Electricity Safety Act require protective equipment that can isolate each of the active conductors of an electrical installation to be installed at prescribed locations.

To satisfy these requirements, customers must control phase loading, power factor, transient current, frequency, harmonic current, inrush current and other negative effects originating within the electrical installation to minimise adverse effects on other customers and the distribution system.

Clauses 2.6 and 4.8 of these Rules, together with the Electricity Distribution Code, contain details relating to these effects. It is necessary to use measures other than those contained in this Clause (5.2) to keep these effects within the required limits.

It is also necessary that each electrical installation connected or to be connected to an electricity distribution network be fitted with a "service protection device" to limit adverse voltage fluctuations on other customers and the electricity distribution system caused by sustained overload or short circuits arising within the electrical installation.

Therefore, the customer or responsible person for each installation connected to an electricity distribution network must provide, install and maintain a "service protection device" or combination of devices:

(i) to minimise the adverse effects of short-circuit or overload within the electrical installation on other customers and the distribution system; and

(ii) to enable each active conductor supplying the electrical installation to be isolated; and

(iii) to enable the Distributor to operate and disconnect each active conductor supplying the electrical installation for commercial and/or safety reasons.

In addition, electrical installations of a type specified in Clause 5.2.1.4 must be controlled so as not to exceed the nominated supply capacity. Dependant upon design considerations, the Service Protection Device may be utilised to achieve this requirement. Alternatively, a separate Supply Capacity Control Device may be installed.

The installation of a load management system should be considered where the demand may approach the maximum supply capacity.

5.2.1.2 Multiple Occupancy Installations

Where an installation is divided into a number of separate occupancies, in addition to service protection as required by this Clause (5.2), Supply Disconnection Devices shall be supplied and installed in accordance with Section 7 of these Rules.

5.2.1.3 Alterations and Repairs

See Clause 1.7 regarding alterations and repairs to existing installations.

5.2.1.4 Supply Capacity

5.2.1.4.1 Supply Capacity Determination

All electrical installations connected to a distributors electricity network are subject to an electricity supply contract or agreement. The contract or agreement usually specifies conditions for the supply of electricity from the network, and the allocated supply capacity.

The supply capacity for an individual electrical installation may be specified in:

- a specific electricity distribution connection agreement or contract; or
- a deemed electricity distribution contract; or
- a electricity distribution demand tariff agreement or contract.

A deemed electricity contract applies in the absence of any other contract or agreement.

Except for electrical installations subject to a deemed electricity distribution contract, the supply capacity, that is, the allocated maximum demand or the allocated supply capacity can be determined from the customers copy of the contract or agreement applicable to the electrical installation.

The relevant electricity distributor should be contacted as detailed in the Areas of Supply section of this document to determine the supply capacity where a customer does not have specific electricity distribution connection agreement or contract or demand tariff agreement available, and where a deemed electricity distribution contract applies.

5.2.1.4.2 Supply Capacity Control Application

Supply capacity to installations specified in the following table shall be controlled in accordance with sub-clause 5.2.1.5.

Applicable Supply Contract or Agreement	New Installations	Existing Installations
a) Demand tariff agreement or contract	New installations subject to a demand tariff agreement or contract that contains a specified allocated maximum demand shall be controlled so as not to exceed the supply capacity (allocated maximum demand).	Existing installations subject to a demand tariff agreement or contract that contains a specified allocated maximum demand shall be controlled so as not to exceed the supply capacity (allocated maximum demand) where the Distributor has specified in writing that the supply capacity be controlled.

b) Specific electricity distribution connection agreement or contract; Or Deemed electricity distribution contract	New installations shall be controlled so as not to exceed a load equal to 125% of their supply capacity where: i) The Distributor has specified in writing that the supply capacity be controlled; or ii) The nature of electricity use by the 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 AS/NZS 3000:2000 exceeds 100Amps per phase; or iv) The electricity supply is not metered.	Existing installations shall be controlled so as not to exceed a load equal to 125% of their supply capacity where: i) The Distributor has specified in writing that the supply capacity be controlled; or ii) The nature of electricity use by the 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 installations maximum demand as determined under the Wiring Rules AS/NZS 3000:2000 exceeds 100Amps per phase; or b) The electricity supply is not metered.

5.2.1.5 Supply Capacity Control

A device or devices other than a fuse link shall control the supply capacity to installations specified in sub-clause 5.2.1.4.

Device/s installed to satisfy sub-clause 5.2.1.4.2 a) shall be designed to operate when the demand exceeds the nominated maximum supply capacity.

Devices that would meet this requirement include moulded case circuit breakers to AS/NZS 3947.2:2002, or a recognised equivalent Standard, with an inverse time-delay characteristic designed to operate when the load exceeds the nominated supply capacity.

Device/s installed to satisfy sub-clause 5.2.1.4.2 b) shall be designed to operate within 2 hours when supplying a load equal to 125% of the supply capacity.

Examples of devices that would meet this requirement include:

- a circuit breaker to AS/NZS 3947.2:2002, or a recognised equivalent Standard, having an inverse time-delay over-current opening characteristic designed to operate within two hours at 125% of the supply capacity; or
- a miniature circuit breaker to AS/NZS 4898:1997, or a recognised equivalent Standard, rated at not more than 86% (125% / 145%) of the supply capacity; (e.g. 63A MCB with 80A supply capacity, or 16A MCB with 20A supply capacity)
- a circuit breaker of either type as detailed above also having an automatic re-closing function that resets when downstream protection clears a fault.

Device/s used to control supply capacity:

- In the case of a single connection to the network that supplies multiple circuits (e.g. separate occupancies), the aggregate of the individual devices directly connected to the network shall not exceed the supply capacity. (Note that Clause 5.2.3.5.1 effectively limits the number of devices to three).

- May be separate and distinct from, and need not be, a service protection device, eg, the electrical installation main switch/es.
- Shall have access to any adjustable settings capable of being restricted by distributor seals or equivalent means.
- Should be arranged to limit the ability of unauthorised persons to interfere with and/or operate the device/s.
- May be operated by any authorised person.

Devices which detect a downstream short-circuit and reset without opening the circuit after the fault is cleared by the downstream protective equipment may be of benefit to avoid unnecessary loss of supply to other circuits.

Load management systems should be considered for installations where an interruption to supply may have adverse customer effects, eg, loss of production.

Where the installation incorporates essential building services such as fire and smoke control equipment, evacuation equipment or lifts, care must be taken to ensure that electricity supply is not inadvertently disconnected from equipment that is required to operate during emergency conditions.

Control equipment for essential building services and general installation supplies should be co-ordinated to ensure that the general supply will be limited before essential supply is affected.

The relevant electricity distributor may accept a load management system as a supply capacity control device where the distributor is satisfied the system controls the installations supply capacity to that specified in sub-clause 5.2.1.4.

Guide to the Selection of Supply Capacity Control Devices

Nominated maximum supply capacity	Suitable CB to AS/NZS 4898:1997	Suitable CB to AS/NZS 3947.2:2002
20A	16A	-
25A	20A	-
32A	25A	-
40A	32A	-
50A	40A	-
63A	50A	-
80A	63A	-
100A	80A	-
125A	100A	125A
160A	125A	160A
200A	-	200A
250A	-	250A
315A	-	315A
400A	-	400A
500A	-	500A
630A	-	630A
800A	-	800A

5.2.2 Service Protection Devices

5.2.2.1 General Requirements

5.2.2.1.1 Circuit Breakers and Fuses

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 Regulations 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, facade).

(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.

(vii) provision of separate terminals for connection of service neutral conductor and consumers neutral conductor within the device enclosure.

5.2.2.1.2 Circuit Breakers

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 5.2.2.1.1:-

(a) be of the fault current limiting type, without considering the effects of any cascading;

(b) have a rated short circuit current capacity equal to or greater than the prospective short circuit current at the point of installation, and in any case not less than 10kA for supplies not in excess of 100A per phase and 15kA for supplies in excess of 100A per phase;

(c) ensure selectivity, with the upstream (Distributor's) and downstream (Customer's) protective devices;

(d) have, or be installed with, a facility for being secured in the 'off' position by means of a seal or a padlock having a 5.5mm diameter hasp;

(e) have access to any adjustable settings capable of being restricted to authorised persons by sealing or equivalent means.;

(f) have all live unmetered terminals and connections enclosed;

(g) have, or be installed with, facilities for sealing unmetered connections to prevent unauthorised access thereto;

(h) where appropriate, incorporate a facility to enable maintenance in accordance with the manufacturers specifications;

(i) be maintained by the customer in accordance with the manufacturers specifications.

Exception:
Non current-limiting Miniature Circuit Breakers to AS3111, remain acceptable for the control of Private Overhead Electric Lines where supply capacity is not intended to be controlled by the Circuit Breaker. (Refer Clause 5.2.1.4)

5.2.2.2 Devices up to 100A rating

5.2.2.2.1 Circuit Breakers

(a) Miniature Circuit Breakers

Circuit Breakers (CBs) used as service protection devices shall comply with AS/NZS 4898:1997 or a recognised equivalent Standard, shall have an instantaneous tripping characteristic in excess of 10In ('D' Curve) and shall have a rated short circuit current interrupting capacity equal to or greater than the prospective short circuit current at the point of installation, and in any case not less than 10kA.

Specific types of CBs having an auto-reclosing facility that limits current during a short circuit and provides selectivity with downstream protective devices may be utilised as a service protection device. Such CBs shall comply with the requirements detailed above.

(b) Pole Mounted Circuit Breakers

Pole Mounted Circuit Breakers shall comply with AS/NZS 3124:2002 or a recognised equivalent Standard.

Pole Mounted Circuit Breakers installed in excess of 2.0m from ground level shall provide for manual operation by means of a low voltage operating stick from ground level and the cover should be provided with means of sealing.

5.2.2.2.2 Fuses

(a) General

Fuses rated at up to 100A shall be capable of accepting fuse links of Type IIa to AS/NZS 60269.2.1:2001 ,or a recognised equivalent Standard, (22mm barrel type) supplied by the Distributor. In these Rules, such fuse links are referred to as "Type 2a".

Exception .
The Responsible Officer may agree to the use of alternative fuse links. Such alternatives may include small enclosed fuse links to AS/NZS 60269.3.1:2002 for Miniature Combined Fuse Switches supplied by the customer.

(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 should be provided with means of sealing.

(c) Panel Mounted Fuses

Panel mounted fuses shall:

(i) comply to AS/NZS 60269.2.1:2001;

(ii) have all live parts shrouded;

(iii) have a continuous rating of not less than 100A (base and holder);

(iv) be capable of being sealed when the fuse carrier is inserted using facilities cast into the base and carrier;

(v) be back connected type (Studs or front wired types are not acceptable).

Spacing, ventilation and de-rating of these fuses should be considered where continuous or steady loads exceeding 80 Amperes are to be carried.

(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 verandah. Many such fuses remain in service today in both 55A and 80A forms. They are no longer acceptable for installation on meter panels

Stick Operated, Panel Mounted Fuses may be employed only where agreed with the Responsible Officer for a specific application.

These fuses are normally only used where an alteration or addition is made to an existing distribution service system, which is installed within or below a verandah, and provision for such fuses exists without significant modification.

Such fuses shall accept Type 2a fuse links and be rated at not less than 80A. These fuses are not acceptable in any application other than similar to that described above and with the specific approval of the Responsible Officer.

(e) Miniature Combined Fuse Switches

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

5.2.2.3 Devices above 100A rating

5.2.2.3.1 Circuit Breakers

Circuit breakers (CBs) having a rated current (In) in excess of 100A per phase shall comply with AS/NZS 3947.2, AS/NZS 4898 or a recognised equivalent Standard and have a rated short circuit current interrupting capacity equal to or greater than the prospective short circuit current at the point of installation, and in any case not less than 15kA.

CBs used to satisfy Clause 5.2.1.4 shall operate within 2 hours at 125% of the Supply Capacity. Note that the clearing time of a CB at 125% rated current (In) may be significantly less than 120 minutes.

Specific types of CBs having an auto-reclosing facility that limits current during a short circuit and provides selectivity with downstream protective devices may be utilised as a service protection device. Such CBs shall comply with the requirements detailed above.

5.2.2.3.2 Fuses

(a) General

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

Exception .
The Responsible Officer may agree to the use of alternative fuse links.

(b) Fused Switch Disconnector (FSD)

Fused Switch Disconnectors shall comply with AS 3947.3 and may be single or multi phase devices which accept 160A, size 00 blade type fuse links.

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 live 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 links.

(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.

5.2.3 Application of Service Protection Devices

5.2.3.1 General

Service protective device/s that comply with Clause 5.2.2 shall be located and installed in accordance with the relevant requirements of the Electricity Safety Act and Regulations (as amended from time to time) and with 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; and

(b) enable each active conductor supplying the electrical installation to be isolated; and

(c) enable the Distributor to operate and disconnect each active conductor supplying the electrical installation for commercial and/or safety reasons.

5.2.3.2 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.

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

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

5.2.3.3 Selection of Device

Grading (or 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 installation is so arranged that three-phase equipment is, or may readily be, connected, and a service protection device does not open all phases simultaneously upon operation, appropriate phase failure protection should be provided within the installation for three phase equipment.

5.2.3.4 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 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, or connections thereto, 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.

5.2.3.5 Security

5.2.3.5.1 General

Service Protection Devices should be 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 Victorian Power Industry Lock, except where a Distributor requires their lock to be fitted.

5.2.3.5.2 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 an electricity 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 link 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 electricity distributors padlock having a 5.5mm hasp.

The number of locks or seals required to secure any one service 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 Victorian Power Industry Lock.

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 electricity distributor.

5.2.3.5.3 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 Victorian Power Industry Lock.

5.2.3.6 Operation

5.2.3.6.1 General

Fuse links, where required, shall be supplied and installed by the relevant electricity 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 electricity distributor; or

(b) Authorised emergency services personnel whilst carrying out their duties; or

(c) Persons eligible to do so under the VESI Code of Practice Low Voltage Service Fuse Removal and Reinsertion by "Electrician" and "L" and "G" Inspector Licence Holders.

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 electricity distributor.

Exception 1.
Persons authorised by the customer responsible for the electrical installation may operate circuit breaker/s installed as service protection device/s provided the circuit breaker/s is/are not sealed or locked off by the distributor in the de-energised position.

5.2.3.6.2 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 should 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 electricity distributor must be advised at the earliest opportunity.

5.2.3.6.3 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.

5.2.4 Acceptable Applications

5.2.4.1 Underground Supply

Service protection device/s shall be installed within a suitable enclosure, such as a meter box, pillar or cubicle, located on the customer's property in a position free of obstruction within 3m of the junction of the consumers mains with the underground service line 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 and the connection of associated conductors.

Exception 1.
The service protection device/s may be located on the metering panel if the consumers mains supplying that panel are constructed in accordance with the requirements of these Rules for "Underground Reticulated Distribution" and the relevant Electricity Safety Regulations.

Exception 2.
Where an overhead service line is replaced by an underground line, the service protection device/s may be located at the point where the overhead line was connected to the premises.

Exception 3.
Subject to compliance with the general principles set out above and the agreement of the Responsible Officer, service protection devices for maximum demands exceeding 100A per phase, may be incorporated in the main switchboard.

Exception 4.
Subject to the agreement of the Responsible Officer, a separate Service Protection Device is not required where customer's unmetered circuit protection devices incorporated in a pillar, cubicle or switchboard provide equivalent means of protection and isolation.

Typical supply arrangements are shown in Figure 5.1.

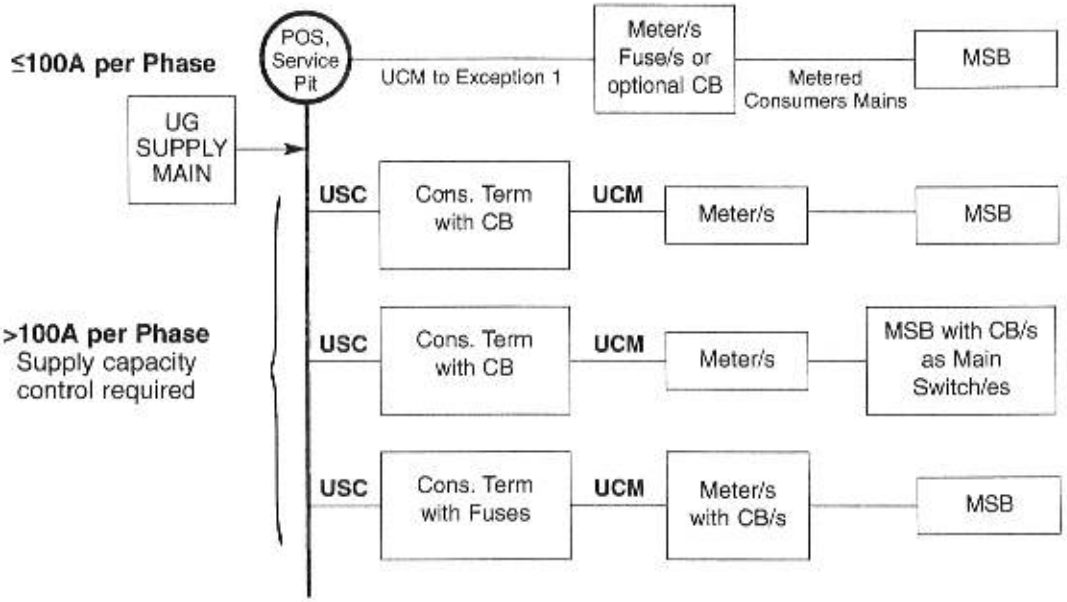
Typical devices and their application are shown in Table 5.

Figure 5.1 - *Typical* Underground Service Protection Arrangements

KEY to Abbreviations:

POS = Point of Supply
UCM = Underground Consumers Mains
MSB = Main Switchboard
Cons. Terms. = Consumer's Terminals
USC = Underground Service Cable
CB = Circuit Breaker

1. Metered Supply



2. Unmetered Supply - Supply Capacity Control Required

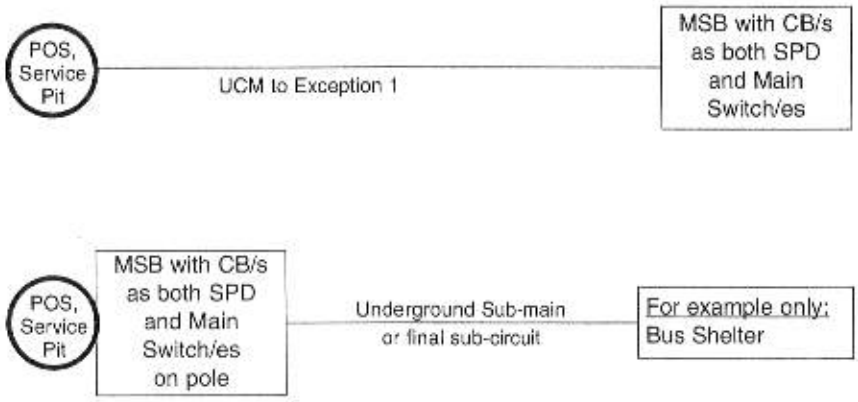


TABLE 5.1 - Guide to Selection of Service Protection Devices - Underground Services

Supply from/to	Current Rating per phase	Location	Device/s	Supply Capacity Control
UG distribution or service cable to Building or Structure	<= 100A	Pillar, Cabinet or Meter Panel	100A panel mounted fuse	Not Required CB Optional
	> 100A	Pillar, Cabinet or Switchboard	Combined Fuse Switch	CB/s as Main Switch/es
	> 100A	Pillar, Cabinet or Switchboard	CB	Provided by CB
Pole Type Substation on property To Building or Structure	<= 100A	On pole to UCM	FOLCB	Not Required CB Optional
	<= 100A	On pole to UCM or POEL	CB	Not Required
	100A <= 400A	On pole to UCM	CB	Provided by CB
	100A <= 400A	On pole to UCM	FSD	CB/s as Main Switch/es
	400 <= 800A	On pole to UCM	Hinged Fuse Switch (by Distributor)	CB/s as Main Switch/es
		On Switchboard	CB / CFS	CB/s as Main Switch/es
UG distribution (pit) to installation in road reserve	<= 20A	Pillar, Cabinet, Switchboard or Meter Panel By negotiation	CB	Provided by CB
	<= 20A		Mini FSD	CB/s as Main Switch/es
	20 <= 100A		FOLCB	CB/s as Main Switch/es
UG distribution P/L pole to installation in road reserve	<= 20A	Within base of steel public lighting pole	CB	Provided by CB

Key to Abbreviations:

FOLCB - Fused Overhead Line Connector Box
FSD - Fused Switch Disconnector
UCM - Underground Consumers Mains
CB - Circuit Breaker
CFS - Combined Fuse Switch
POEL - Private Overhead Electric Line

5.2.4.2 Overhead Supply

5.2.4.2.1 General

Service protection device/s shall be installed within 0.5m of the point of attachment of an overhead service line in a position free of obstruction where access is readily available for:

(i) manual operation of device/s from ground level with a low voltage operating stick; and

(ii) safe work on the device/s and the connection of associated conductors by means of a ladder.

Refer to Clause B1, Appendix B, regarding Aerial Consumers Mains (Private Overhead Electric Lines).

Exception.
The service protection device/s need not be located adjacent to the point of attachment where so permitted by the relevant Electricity Safety Regulations and approved by the Responsible Officer.

For example, where the agreed rate of supply exceeds 100A per phase, the Responsible Officer may agree to the installation of a service protection device at the origin of the service line.

Note: Where the Responsible Officer agrees to install the service protection device on the Distributor's pole, the customer shall meet all additional costs involved and the consumers mains shall terminate at a suitable terminating device adjacent to the point of attachment of the service line.

5.2.4.2.2 Mounting Height

Service protection device/s shall be installed not less than 3 metres and not greater than 6 metres above ground level.

Exception 1.
The minimum mounting height may be not less than 2.7 metres where associated with facade servicing and installed below an awning or verandah over a public thoroughfare.

Exception 2.
The minimum mounting height may be not less than 1.0m above ground level where a hand operated CB is installed in an enclosure (such as a meter box or switchboard) at the origin of a private overhead electric line and suitable conductors are run between the point of attachment and the service protective device enclosure.

Typical supply arrangements are shown in Figure 5.2.

Typical devices and their application are shown in Table 5.2.

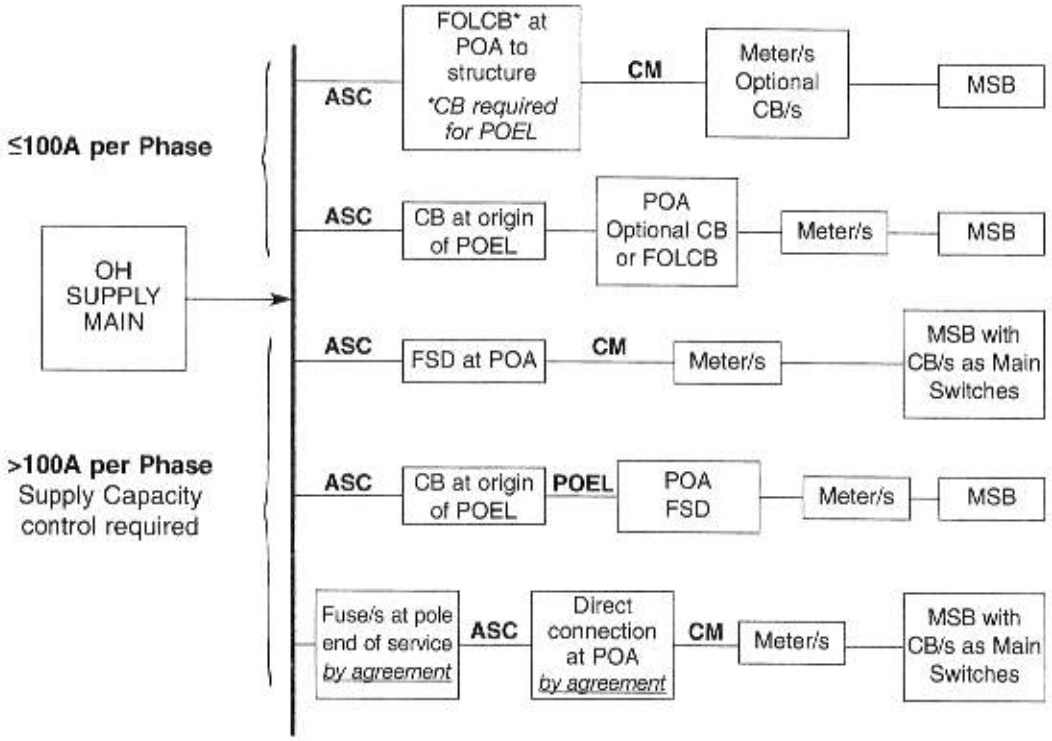
Note: Refer to Clause 5.5 regarding location of point of attachment and ground clearance requirements for overhead services.

Figure 5.2 - *Typical* Overhead Service Protection Arrangements

KEY to Abbreviations:

POS = Point of Supply
POEL = Private Overhead Electric Line (incl. ACM)
MSB = Main Switchboard
Cons. Term. = Consumer's Terminals
ASC = Aerial Service Cable
CB = Circuit Breaker

1. Metered Supply



2. Unmetered Supply - Supply Capacity Control Required

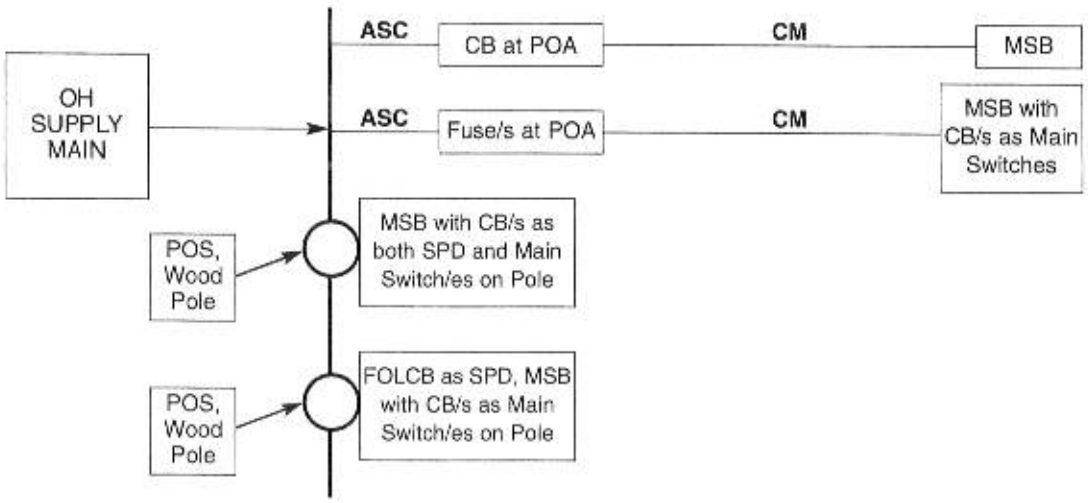


TABLE 5.2 - Guide to Selection of Service Protection Devices - Overhead Services

Supply	Current Rating per phase	Location	Device/s	Supply Capacity Control
To Building or structure	<= 100A	POA on building or structure	FOLCB	Not Required Optional CB/s
	100 <= 170A		FSD	CB/s as Main Switch/es
To POEL	> 100A	First private pole in all cases	CB	Not Required Optional CB/s
	100 <= 170A		CB	Provided by CB
On / from Distributor service pole (by agreement only)	<= 20A (Unmetered)	Switchboard on pole	CB	Provided by CB
	<= 20A (Unmetered)	Switchboard on pole	Mini FSD	CB/s as Main Switch/es
	<= 100A	POA on pole	CB	Provided by CB
	<= 100A	POA on pole	FOLCB	CB/s as Main Switch/es
	100 <= 170A	POA on pole	CB	Provided by CB
	100 <= 170A	POA on pole	FSD	CB/s as Main Switch/es

Key to Abbreviations:

FOLCB - Fused Overhead Line Connector Box
FSD - Fused Switch Disconnector
POA - Point of Attachment
CB - Circuit Breaker
CFS - Combined Fuse Switch
POEL - Private Overhead Electric Line

5.2.4.3 Facade Supply

The provisions of Clauses 5.2.3 and 5.2.4.2 generally apply to overhead servicing of buildings having verandahs or awnings across the face.

However, where these clauses cannot readily be satisfied, and subject to the agreement of the Responsible Officer, the following arrangements may be employed in conjunction with service lines installed on the facade of a structure.

Service protection device/s shall be installed adjacent to the point where the unmetered consumers mains are connected to the distributors conductors in a position free of obstruction (usually above a verandah or awning) where access is available by means of a ladder for:

(i) manual operation of the device/s; and

(ii) safe work on the device/s and the connection of associated conductors.

In addition, the following shall apply:

(a) the consumer's mains shall be run to a supply disconnection device mounted in an accessible position (e.g. under a shop verandah); or

(b) a supply disconnection device shall be fitted on the meter panel (e.g. where the metering is installed in an external position or forms part of a group metering location).

5.2.4.4 Supply from Distributor's Pole

The provisions of Clauses 5.2.2 and 5.2.3 also apply to devices used to control supplies to electrical installations that originate at a Distributor's pole on the customer's property ñ whether private or public property, including a road reserve containing the electrical installation.

A Circuit Breaker used as a Service Protection and/or Supply Capacity Control Device may be housed in a weatherproof, UV stabilized enclosure installed on the pole.

Service protection device/s installed on Distributor's poles shall be mounted not less than 3.0m above ground level and generally at a nominal height of 4.0m.

Exception 1.
The minimum mounting height may be not less than 2.7 metres where associated with facade servicing and installed on a pole below an awning or verandah over a public thoroughfare.

Exception 2.
The minimum mounting height of a hand operated service protective device may be not less than 1.0m above ground level where installed in an enclosure (such as a meter box or switchboard) on the pole and consumers mains are installed on the pole between the consumers terminals and the enclosure.

Exception 3.
The Responsible Officer may agree to the provision of a suitable protective device on the pole by the Distributor. Where the Responsible Officer agrees to install the service protection device on the Distributor's pole, the customer shall meet all additional costs involved.

Note: Attention is also directed to the safety requirements for working on poles detailed in Clause 5.4.3 of these rules.

Typical supply arrangements are shown in Figure 5.3.

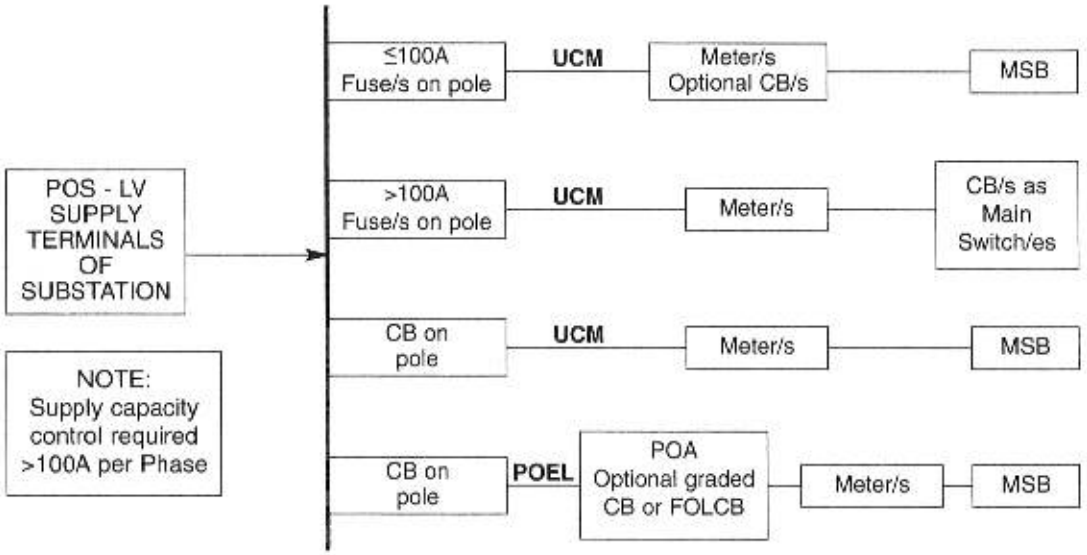
Typical devices and their application are shown in Table 5.3.

Figure 5.3 - *Typical* Service Protection Arrangements Supply Direct from Distributor's Pole

KEY to Abbreviations:

POS = Point of Supply
MSB = Main Switchboard
CB = Circuit Breaker
POEL = Private Overhead Electric Line (incl. ACM)
UCM = Underground Consumers Mains

1. Metered Supply - (Includes Pole Type Substations).



2. Unmetered Supply - Supply Capacity Control Required - (Includes Pole Type Substations).

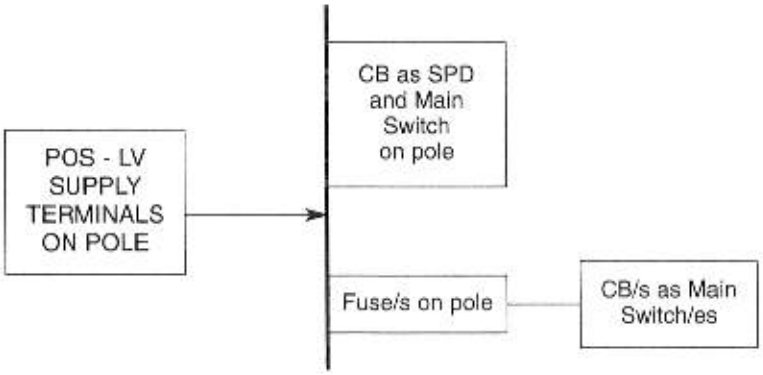


TABLE 5.3 Guide to Selection of Service Protection Devices - Supply Direct from Distributor's Pole

Nature of Supply	Current Rating per phase	Location	Device/s	Supply Capacity Control
Metered Supply from Pole with LV mains or Pole Type Substation	<= 100A	Pole	FOLCB	Not Required Optional CB/s
	100 <= 170A	Pole	FSD	CB/s as Main Switch/es
	> 170A	LV Cross-arm	Fuses by Distributor	CB/s as Main Switch/es
Unmetered Supply from pole with LV mains or Pole Type Substation	<= 20A	Switchboard on pole	Mini FSD	CB as Main Switch
	<= 20A	Switchboard on pole	CB	Provided by CB
	20 <= 100A	4.0m high on pole	FOLCB	CB/s as Main Switch/es
	20 <= 100A	4.0m high on pole	CB	Provided by CB
	100 <= 170A	4.0m+ high on pole	FSD	CB/s as Main Switch/es
	100 <= 170A	In enclosure on pole	CB	Provided by CB

Key to Abbreviations:
FOLCB - Fused Overhead Line Connector Box
FSD - Fused Switch Disconnector
CB - Circuit Breaker

5.2.4.5 Supply direct from enclosed substation

The provisions of Clauses 5.2.1, 5.2.2, and 5.2.3 also apply to devices used to control supplies to electrical installations that originate at an enclosed substation on the customer's property - whether private or public property, including a road reserve containing the electrical installation.

The Service Protective Device/s shall be located outside the substation enclosure as close as reasonably practicable to the low voltage terminals of the substation.

Exception 1.
The Responsible Officer may agree to the provision of a suitable protective device within the Distributor's substation.

Exception 2.
The Responsible Officer may agree 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.

Exception 3.
The Responsible Officer may agree 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.

Typical supply arrangements are shown in Figure 5.4.

Typical devices and their application are shown in Table 5.4.

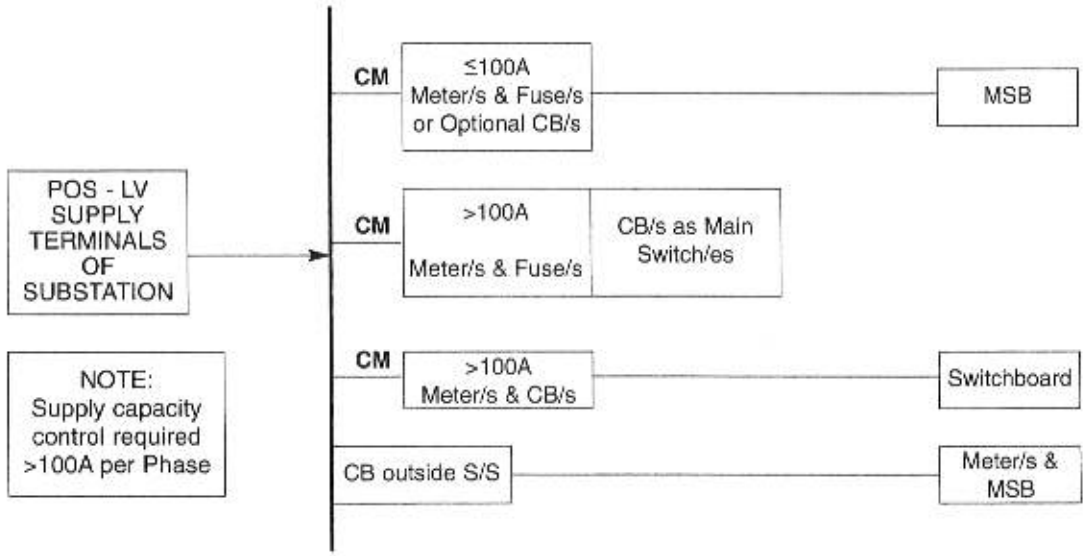
Figure 5.4 - *Typical* Service Protection Arrangements Supply from Enclosed Substation

KEY to Abbreviations:

POS = Point of Supply
CM = Consumers Mains
CB = Circuit Breaker
POEL = Private Overhead Electric Line (incl. ACM)
MSB = Main Switchboard
S/S = Substation

1. Metered Supply

Note: For Unenclosed Pole Type Substations
Refer to "Supply Direct from Distributor's Pole".



2. Unmetered Supply - Supply Capacity Control Required

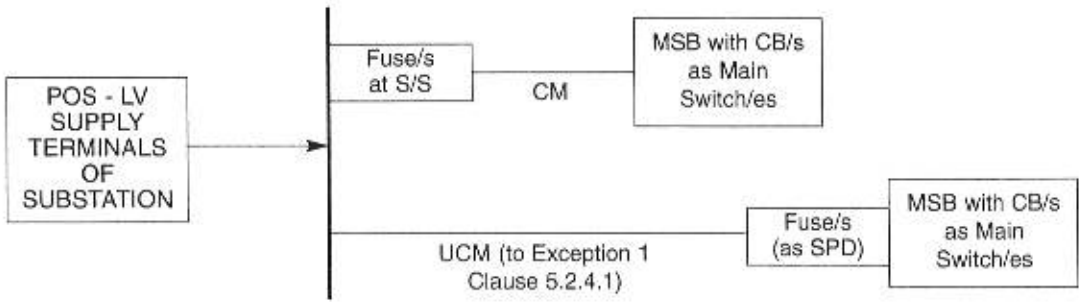


TABLE 5.4 Guide to Selection of Service Protection Devices - Supply Direct from Enclosed Substation

Type of Supply	Current Rating per phase	Location	Device/s	Supply Capacity Control
Metered supply from enclosed substation	<= 100A	On meter panel	Panel Mounted Fuse/s	Not Required Optional CB
	<= 100A	On meter panel	CB (Optional)	Provided by CB
	> 100A	Adjacent to Substation	CB	Provided by CB
	> 100A	Adjacent to Substation	CFS	CB/s as Main Switch/es
	> 100A	At remote MSB (by agreement)	CB	Provided by CB
	> 100A	At remote MSB (by agreement)	CFS	CB/s as Main Switch/es
Unmetered supply from enclosed substation	All ratings	Adjacent to Substation	CB	Provided by CB
		At remote MSB (by agreement)	CB	Provided by CB

Key to Abbreviations:
CB - Circuit Breaker
CFS - Combined Fuse Switch
MSB - Main Switchboard

5.3 Consumer's Mains

5.3.1 General

The customer is responsible for the provision, installation and maintenance of Consumer's Mains.

In accordance with the relevant Regulations, all electrical wiring work associated with the installation and maintenance of Consumer's Mains shall be carried out, on behalf of the customer, by a Registered Electrical Contractor (REC) to the satisfaction of the Responsible Officer and in accordance with both the relevant provisions of the Electricity Safety (Installations) Regulations and the additional requirements of these rules.

Unmetered sub-mains shall be considered as consumer's mains for the purposes of these Rules.

The Distributor reserves the right to determine the location of the Consumer's Terminals. Reference should be made to Clauses 1.6, 5.1 and 5.2 regarding Points of Supply and provision of Service Protection Devices.

Note: Attention is directed to Clauses 5.1.3 and 6.6.2 where the use of aluminium conductors or compacted and/or compressed copper conductors is being contemplated.

5.3.2 Size of Consumer's Mains

The minimum size of consumer's mains for any installation shall be in accordance with the Electricity Safety (Installations) Regulations and in any case, for individual domestic installations, shall be such that the conductors are capable, under installed operating conditions including those of voltage drop, of supplying a minimum total loading of 8.4 kVA at the occupancy main switchboard. No conductor forming any portion of consumer's mains shall have a cross sectional area of less than 4.0mm^2.

5.3.3 Identification of Consumer's Mains Conductors

Conductors shall be colour coded or otherwise marked to clearly and permanently identify each incoming active conductor and the neutral conductor. In the case of polyphase supplies, the active conductors shall be clearly and permanently identified to indicate each phase, i.e. red, white, blue. Any identification as required above shall be located at a position on the cable not likely to be removed where it is necessary for the cable to be stripped for termination.

Where heat shrinkable tubing is to be applied to cable ends, the tubing shall be appropriately coloured to indicate the function of each core as detailed above.

Where the conductor core of an insulated and sheathed cable is to be changed in polarity, e.g. red coloured core to be used as a neutral, the cable shall be sleeved with heat shrinkable tubing of appropriate colour over the conductor core for the entire stripped length of the individual core. Such sleeving shall consist of a minimum layer of medium wall heat shrinkable tubing or two layers of thin wall heat shrinkable tubing. Refer to Clause 5.4.3.8.

Note: From a safety viewpoint, identification of the consumer's main neutral conductor is critical. This conductor shall be coloured black.

5.3.4 Wiring Systems

Where consumer's mains are not protected on the supply side by short circuit protective devices, double insulation of each conductor shall be fully maintained up to the terminal of the first protective device and neutral termination within the installation or the installation shall otherwise be arranged to comply with the Electrical Safety (Installations) Regulations.

Note: A Service Protective Device is deemed to provide the short circuit protection referred to above.

5.3.5 Joints in Un-metered Consumer Mains

Joints in un-metered consumer mains shall be made in such a manner as to deter unauthorised access, interference or diversion of electricity supply and to the satisfaction of the relevant distributor.

Joint Location		Acceptable jointing methods
Not readily accessible or visible, eg:	• Roof Space • In Wall • Underfloor	Join enclosed in a suitable junction box filled with a hard setting, non conductive compound
Visible and readily accessible position, eg:	• Adjacent the meter position • On a pole or wall	Join enclosed in a suitable junction box with provision to fit a distributors seal
Behind a hinged meter panel	Meter panel with provision to fit a distributors seal	
Underground	1. Join enclosed in a suitable junction box or similar enclosure filled with a non conductive, non hydroscopic 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	

5.4 Underground Supplies

5.4.1 General

Where the location of the Consumer's Terminals has not been previously established by the installation of a service pit or similar, the Responsible Officer will determine the location of the consumer's Terminals. The customer may be required to provide, install and maintain facilities for the installation of the service cable in accordance with Clause 5.1.

Typical arrangements are shown in Figures 5.1, 5.2 and 5.3.

5.4.1.1 Safety

(a) Substations

Where cables are to be installed on or in a Distributor 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 Distributor to de-energise the substation prior to, and during trenching operations.

Note: Damage to a high voltage earthing conductor can cause an extremely hazardous situation.

(b) Poles

A minimum safe working clearance from any live apparatus of 2.0m shall be maintained by all persons and apparatus in personal contact therewith. If this clearance cannot be maintained, the Distributor **SHALL** be consulted before proceeding.

Any timber 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.

(c) Service Pits

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

5.4.1.2 Notice of Proposed Installation

It is essential that the method and Point of Supply be determined with the Responsible Officer at an early date. Where an underground Service Cable is to be installed, there is a requirement for the Distributor to ensure various public authorities are notified of the intention to install the cable in a public roadway or, in some cases, to negotiate an easement for the cable on an adjoining property.

In these circumstances, it is necessary that the REC provide a **MINIMUM OF 20 WORKING DAYS** notice before supply is required, to enable the Distributor to effect the notification mentioned above and subsequently to arrange or approve the installation of the Underground Service Cable.

In this regard, the REC shall notify the Distributor **IN WRITING** as required by (a) to (d) below. **FAILURE TO PROVIDE WRITTEN NOTICE AS SPECIFIED MAY RESULT IN CONNECTION TO SUPPLY BEING DELAYED.**

(a) Service Pit not Installed

Where the Distributor nominates a Point of Supply on the property boundary and no service pit exists at that point, the **MINIMUM** notice required is **20 WORKING DAYS**. Notice shall be effected by submission of a fully completed Electrical Work Request (Electrical Work Advice in Powercor Australia's area) and shall, in addition, include a sketch plan of the proposed consumer's mains route.

(b) Service Pit Installed

Where the Distributor nominates a Point of Supply which has been predetermined by the prior installation of a suitable service pit abutting the property boundary (as occurs in Underground Reticulated Distribution and "rural" subdivisions), the **MINIMUM** notice required is **6 WORKING DAYS.**

(c) Pole or Substation on Property

Where the necessary arrangements and construction of a Distributor substation or line on the customer's property have been completed and the Distributor nominates a Point of Supply on that substation (or Distributor pole), the **MINIMUM** notice required is **6 WORKING DAYS.**

In addition, to satisfy Clause 5.4.1.1 regarding Distributor substations, it may be necessary to co–ordinate Distributor and REC works. Hence, early consultation with the Responsible Officer is essential.

(d) Conversion from Overhead to Underground

Where an existing overhead supply remains operative, notice as required by the preceding sub–clauses shall be provided.

However, in the event that existing Consumer's Mains are defective and it is proposed to install Underground Consumer's Mains and an Underground Service Cable, the REC shall liaise with the Responsible Officer to enable appropriate notification to be given by the Distributor to other Authorities in accordance with the requirements stated earlier in this Clause, **BEFORE COMMENCING** any work.

(e) Notice to Other Authorities

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

5.4.1.3 Location of Consumer's Terminals

For Determined Maximum Demands not exceeding 100 A per phase, the Consumer's Terminals will normally be located within a pit at the property boundary. In special cases and subject to the approval of the Responsible Officer, the Underground Service Cable may terminate in a pillar, meter box, cubicle, or other suitable terminating device at the property boundary. Refer to Clause 5.4.3.7 for further information on facilities required for termination of the service cable.

Where the Determined Maximum Demand exceeds 100 A per phase, the Consumer's Terminals will normally be located in a pillar, cubicle, or switchboard located on the

customer's property at the property boundary, however, as good engineering practice, the Underground Service Cable may be extended up to 5 metres into the property to be supplied.

Where the Determined Maximum Demand exceeds 100 A but is less than 170 A, and the service cable is protected at its origin, the Responsible Officer may approve the installation of a pit in lieu of a pillar or cubicle.

In special circumstances, subject to the approval of the Responsible Officer the service cable may be extended beyond 5 metres into the property to be supplied. Any such approval shall be subject to written conditions of contract between the local Distributor and the customer.

The Customer shall be responsible for the cost of the installation and maintenance of that portion of the service cable within the property to be supplied, and where required, the provision of a pillar, meter box, cubicle or other suitable enclosure including a service protection or disconnection device on which the cables are to be terminated.

Note: Consumer's mains greater than 50 mm^2 in size shall not terminate in a standard pit.

5.4.1.4 Private Pole on Property

In general, private poles for termination of aerial service cables on the customer's property are not permitted.

The following requirements apply, where, due to extenuating circumstances (e.g. a major underground drain or channel obstructs an underground cable route) and where no other means of servicing is practicable, a private pole is permitted after consultation with the Responsible Officer:

(a) The pole height and method of termination shall be to the satisfaction of the Responsible Officer. Pole height shall provide necessary clearances for the Distributor service line.

(b) The REC shall terminate Underground Consumer's Mains on the private pole, generally as follows –

- Where the maximum demand does not exceed 100 A per phase, the Underground Consumer's Mains shall terminate in a Fused Overhead Line Connector Box (FOLCB) mounted on the pole between 3.0 m and 6.0 m above ground level or, in cases where a circuit breaker is installed in lieu of an FOLCB the circuit breaker shall be mounted between 3.0 m and 4.0 m above ground level. Refer to Appendix B, Clause B3.3 for further information on poles.
- Where the maximum demand is between 100–170 A per phase, the Underground Consumer's Mains shall terminate at the point of attachment of the overhead service line as detailed by the Responsible Officer. Refer to Clause 5.4.3.6(c).

Note: Refer to Clause 5.4.2.3(a) – Financial Arrangements – Compulsory Underground Supply.

5.4.2 UNDERGROUND SERVICE CABLES

5.4.2.1 Identification of Property Boundary

Where an Underground Service Cable is to be installed to a property, the Responsible Officer shall nominate the location on the property boundary at which the Point of Supply will be established.

In the event that the boundary of the property to be supplied is not clearly defined, the prospective customer shall be responsible for the provision of such written information as the Responsible Officer may require to identify that boundary.

In general, Private Electric Lines shall not extend outside the boundary of the property on which the Point of Supply is established.

5.4.2.2 Conditions for Underground Supplies from Overhead Distribution Mains

There are two different conditions under which L.V. Underground Service Cables may be installed from the Distributor's overhead reticulation system to a property, namely –

1. ***"Compulsory" Underground Supply*** – where the service cables are required to be installed underground.

This will normally occur where –

- The Electrical Safety (Installations) Regulations requires the consumer's mains to be placed underground in hazardous bushfire risk areas, (refer to Clause 5.1.2.2) and the service to the property will, where practicable, be underground;
- The formal conditions under which supply is to be provided, specify an underground service cable;
- The required clearances for an aerial service cable cannot be achieved and/or, maintained or
- The Determined Maximum Demand to be provided from the L.V. overhead distribution mains exceeds 170 A per phase.

In all cases the underground service cable shall be installed from the distribution system to the Point of Supply for the property as detailed in Clause 5.4.1.3 and Figures 5.1, 5.2 or 5.3.

Exceptions to the mandatory use of an Underground Service Cable will be considered where –

- due to physical constraints, it would not be practicable to underground the cables (e.g. a major underground drain or channel obstructs the necessary route);
- the customer would be involved in significant added costs in relocating an existing overhead Point of Supply provided that a suitable aerial service can be erected to satisfy all other conditions and clearances required by these Rules.

2. ***"Elective" Underground Supply*** – where the customer would normally be provided with an overhead service to the property but has, for aesthetic or other reasons, chosen an Underground Service Cable.

In all cases the provision and installation of an Underground Service Cable shall be subject to the approval of the Responsible Officer and, where approved, shall be installed from the distribution system to the Point of Supply for the property as detailed in Clause 5.4.1.3 and Figures 5.1, 5.2 or 5.3.

5.4.2.3 Financial Arrangements

(a) Compulsory Underground Supply

The conditions for provision of electricity supply, may in general, include the payment of fees. Details of current charges should be obtained from the relevant Distributor at an early date.

Where it is not practicable to install an Underground Service Cable (due to obstruction, rock, major drain or channel etc) and **SUBJECT TO PRIOR APPROVAL** by the Responsible Officer, the Distributor will normally provide an aerial service to the property. In such cases, the customer shall provide, install and maintain an approved service cable termination – including a pole where necessary – for the purpose of termination and connection of the Distributor's aerial service cable. Refer to Clause 5.4.1.4 – Private Pole on Property.

(b) Elective Underground Supply

In areas and situations where supply would normally be provided by means of an aerial service cable, a customer may elect to have an Underground Service Cable installed to the

property. However, the provision of an underground service cable in this situation is conditional upon both the Distributor's agreement thereto and the customer undertaking responsibility for meeting all additional costs incurred by the Distributor in providing the Underground Service Cable.

5.4.3

UNDERGROUND CONSUMER MAINS

5.4.3.1 Cable Route

(a) General

Private Electric Lines should not extend outside the boundary of the property on which the Point of Supply is established. Reference should be made to Part 3, Division 4 of the Electricity Safety Act.

The route of Underground Consumer's Mains should, to the extent which is practicable, be selected with due regard to avoid substation earthing systems and comply with the requirements of Clause 5.4.3.1(e) in Underground Reticulated Distribution areas of supply.

(b) Record of Cable Route

The route of all underground electric lines in all installations shall be permanently recorded on a durable card or other suitable material which shall be completed and fixed within the meter box (or other suitable position in the absence of a meter box) to provide a permanent guide for the use of the customer and other interested parties.

In all cases, sufficient points should be recorded by way of running distances and offsets from the boundary fences and/or the lines (or the projection thereof) of permanent structures so that the position of the cable at any point can be determined with an accuracy of ± 0.2 m.

Marking on the inside of a meter box door with a permanent marker pen, laminating of plans or enclosing plans in a suitable plastic wallet is acceptable.

Samples of completed cards are shown in Figure 5.4.

In the case of a multiple installation, a guide shall be installed at each occupier's installation and shall include the complete route from the Point of Supply to the particular installation.

As an alternative where there is insufficient space on a cable location card to record all the relevant information, it is recommended that a durable drawing protected by a plastic wallet or by laminating, be placed within the main switchboard and/or group metering enclosure. Notice of the location of this drawing shall be affixed on or adjacent to each multiple occupancy switchboard.

(c) Major Assets of Other Authorities

A Private Electric Line may cross an asset of another Authority only where that asset is located within the boundaries of the private property. Any charges associated with establishing or maintaining such a crossing shall be met by the customer.

Any crossing of another Authority's asset/easement shall be constructed in accordance with the requirements of these Rules and, **IN ADDITION**, with any reasonable special conditions of the other Authority. Refer to Clause 5.4.1.2 (e).

Where a major asset (such as a major drain or channel , etc.) is installed parallel with and abutting the property boundary facing the road reserve or property from which electricity supply is to be obtained, the Distributor may provide an overhead service line across the asset to a private pole at a location within the property nominated by the Distributor.

In cases where the other Authority owns the land on which its asset is placed, the Distributor will provide supply to the (separate) property across the Authority's land at an appropriate

location and in accordance with the Distributor's prevailing terms and conditions for an extension of the Distributor's distribution system.

(d) Entry to Building

Provision should be made in the building at construction stage for the consumer's mains to pass through the building foundations and into the metering position, as shown in Figures 5.5 and 5.6.

If provision has not been made at the initial building stage, the consumer's mains shall be installed at not less than the minimum depth specified to a point directly below the outside of the exterior wall foundations. The conduit shall then be enclosed in galvanised steel tube or approved equivalent from the conduit bend or elbow as it ascends vertically upwards, negotiates the foundations and enters the wall cavity, as shown in Figures 5.7 and 5.8.

Note: Care must be taken to arrange underground cable enclosures in such a manner as to prevent moisture entering the building via the enclosure; particularly where a pit or conduit end is installed at a higher level than the entry to the building.

(e) Underground Reticulated Distribution (URD)

Where supplied from Underground Reticulated Distribution, the consumer's mains shall be installed underground to a point directly below the metering position and the length of consumer's mains extending from ground level to the metering position shall be kept to the practicable minimum. The cable route may pass under a concrete slab floor or through a footing where appropriate.

Where the design of the structure restricts compliance with the above, the Responsible Officer shall be consulted **PRIOR TO INSTALLATION,** to consider alternative methods of achieving an equivalent degree of protection.

5.4.3.2 Inspection

Any portion of unmetered consumer's mains in URD areas between the Consumer's Terminals and the first electrical protective device (e.g. fuse or circuit breaker) which is installed within a building other than as in Clause 5.4.3.1 (e) should not be hidden from view by any structural lining until permission has been obtained from the Responsible Officer. Refer to Clause 5.4.3.1 (e) .

At an appropriate stage of the construction, the REC should advise the Responsible Officer to enable any required inspection to be made and approval obtained.

5.4.3.3 Cables

(a) Minimum Size

The minimum size for Underground Consumer's Mains shall be in accordance with the Wiring Rules and Clause 5.3.2.

(b) Minimum Insulation Resistance Level

- Between conductors; and
- between conductors and earth or metallic sheath,

The insulation resistance of unmetered underground consumer's mains should be not less than the following value when tested using a 500 V 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.

(c) Wiring Systems ("Cables")

Underground Consumer's Mains shall be installed in such a manner that, in the event of future accidental damage being sustained, the likelihood of such damage producing a short circuit between conductors and, hence, reliable operation of electrical protection is enhanced.

Unsheathed Thermoplastic Insulated (single insulated) cables should not be used for unmetered underground consumers mains.

Where supplied from Underground Reticulated Distribution, the wiring system shall be one of those specified in Table 5.2 up to the first electrical protective device located within the customer's installation.

In other cases, the wiring system should be one of those specified in either Table 5.2 or Table 5.3 unless otherwise approved by the Responsible Officer in special circumstances.

Where installed in a pipe or conduit all conductors should, except for non–metallic conduit as provided below, be contained within the one pipe or conduit:

- 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.

Single core, insulated and sheathed cables of less than 95 mm^2 cross sectional area shall be enclosed where required by Tables 5.2 and 5.3.

Where indicated in Table 5.3, single core, insulated and sheathed cable of 95 mm^2 cross–sectional area or greater, may be buried direct and protected by approved cover slabs provided the cables are neatly and securely lashed together to form a bundle during installation.

Note: See Clauses 5.1.3, 5.3.1 and 5.4.3.8 (c) regarding limitations on the use of certain wiring systems where connected within a pit.

Table 5.2 Wiring Systems: Underground Reticulated Distribution

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

Notes:

1. Compacted and/or compressed stranded copper conductor having less than 18 strands will not be terminated to a Distributor service cable in a pit, without the prior approval of the Responsible Officer.
2. Where difficulty is encountered in achieving the minimum cover specified, refer to Clause 5.4.3.5 – Laying Below Ground (a) Minimum Depth.
3. Maximum size Underground Consumer's Mains which can be directly connected to a Distributor service cable within a standard pit is 50 mm^2 copper conductor.

Table 5.3 Wiring Systems : Other Than Underground Reticulated Distribution

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
Unsheathed, thermoplastic insulated cable (single insulated) complying with AS 3147	Refer to Clause 5.4.3.3 – (c) Wiring Systems ("Cables")	Not Permitted	Not Permitted
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	0.5 m Restricted. Refer to Clause 5.4.3.3 – (c) Wiring Systems ("Cables")
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
Multi–Core Armoured Cable, paper insulated lead sheathed with hessian serving or pvc outer sheath, complying with AS 1026	0.5 m	0.5 m	0.5 m
Multi–Core Armoured Cable, elastomer thermoplastic or xlpe insulated with bedding and sheathing or serving complying with AS 3116, AS 3147 or AS 3198	0.5 m	0.5 m	0.5 m
Mineral Insulated Metal Sheathed Cable, complying with AS 3187 and AS 3000 for underground use.	0.5 m As Reqd by Clause 5.4.3.5 – (a) Minimum Depth	0.5 m As Reqd by Clause 5.4.3.5 – (a) Minimum Depth	0.5 m As Reqd by Clause 5.4.3.5 – (a) Minimum Depth

Notes:

1. Compacted and/or compressed stranded copper conductor having less than 18 strands will not be terminated to a Distributor service cable in a pit, without the prior approval of the Responsible Officer.
2. Stranded copper required for pit connections. Refer to Clause 5.4.3.8 (c) Pit at Property Boundary.
3. Where difficulty is encountered in achieving the minimum cover specified, refer to Clause 5.4.3.5 (a).
4. Maximum size Underground Consumer's Mains which can be directly connected to a Distributor service cable within a standard pit is 50 mm^2 copper conductor.

5.4.3.4 Mechanical Protection of Cable

Acceptable protection for Underground Consumer's Mains is detailed in the following sub-clauses and Tables 5.2 and 5.3.

(a) Cable Covers

Polymeric cable covers shall comply with AS2053 having a minimum thickness of 3mm.

Concrete cover slabs shall have a minimum thickness of 40 mm and a classification of not less than Grade 15 to AS 3600 – SAA Concrete Structures.

Cover slabs shall be placed over the cable firmly butted together in a continuous line throughout its length. The slabs shall overlap the cable by a minimum of 40 mm on each side of the cable and shall be placed not more than 75 mm above the cable.

All cover slabs unless light orange in colour shall be further identified by the addition of orange marker tape installed in accordance with the Electricity Safety (Installations) Regulations.

(b) Cable Guards

Cable guards shall be of a type specifically approved for the purpose.

Sheet steel guards shall have a minimum thickness of 1.6 mm and be protected against the effects of corrosion by galvanising to AS 1397 for above ground use and to AS 1650 for below ground use; or other equivalent treatment.

5.4.3.5 Laying Below Ground

The bottom of the trench shall be free from all sharp projections and provide uniform support for the cable or its enclosure and the installation of the consumer's mains shall be carried out in accordance with the requirements of the Wiring Rules.

Note: Care should 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.

(a) Minimum Depth

The MINIMUM depth of cover above the top of the mechanical protection for the cable (measured to the final finished ground level) shall be as shown in Table 5.2 or 5.3 for the particular case.

In areas subject to cultivation or camping, this minimum should be added to the depth of cultivation or tent pegs, etc, expected in the location of the cable. Attention is also directed to AS 3001 – Electrical Installations – Movable Premises (including caravans) and their Site Installations, regarding underground wiring where tent pegs are likely to be driven.

In locations where it is impracticable to maintain the minimum depth specified (for example, by obstruction from other underground installations or continuous rock), the Responsible Officer may approve a lesser depth of burial subject to the following –

- The cable enclosure shall be laid in a channel chased into the surface of the rock and covered with a layer of fine aggregate concrete not less than 50 mm thick; or
- The cable shall be enclosed in medium or heavy galvanised steel tube to AS 1074 and covered with approved cover slabs or provided with an equivalent degree of mechanical protection. Such a system shall be laid at a depth of not less than 0.3 m; or
- Served Mineral Insulated Metal Sheathed ("MIMS") cables suitable for use underground may be laid in a channel chased in rock and covered with fine aggregate concrete or enclosed in heavy-duty rigid conduit and laid directly below a paved area.

(b) Use of Common Trench

If required, a common trench may be used within private property to accommodate the electric cable and the service assets of other authorities (such as communication cables and

water service). In some cases, the cable may need to be enclosed in a wiring enclosure as required by the Wiring Rules (Section 3). Also refer to Tables 5.2 and 5.3 for further details. Unnecessary crossing of other services should be avoided where possible.

The requirements of other authorities for use of a common trench including clearances and minimum depth shall also be met.

Note: In general, the electrical system should be laid below other services and the trench partially backfilled prior to installing the other services.

(c) Distributor Pole on Property (Including Pole Type Substations)

Where the Underground Consumer's Mains are to be attached to a Distributor pole (whether timber, concrete or steel) and a rigid cable enclosure is used in the ground, the rigid cable enclosure shall be stopped between 0.5 and 1.0 m away from the pole and sufficient slack cable shall be left at the base of the pole to allow for pole replacement. (For "large" cables, the slack should be provided by forming a "drip loop" of cable at the base of the pole).

Conductors consisting of –

- multi–core cables of 20 mm or less outside diameter; or
- single–core insulated and sheathed cables of less than 95 mm^2 conductor cross–sectional area,

shall be enclosed in flexible or corrugated non–metallic conduit suitable for use in direct sunlight, from the end of the rigid cable enclosure to and up the pole adjacent to the point of termination.

Single–core insulated and sheathed cables 95 mm^2 or greater in cross–sectional area may remain unenclosed from the end of the rigid cable enclosure provided they are lashed together in the ground during installation.

In all cases, the cable or flexible conduit between the end of the rigid cable enclosure and the Distributor's pole shall be protected by approved cover slabs and installed in accordance with the Electricity Safety (Installations) Regulations. Refer Figure 5.13.

5.4.3.6 Installation Above Ground

(a) Outdoor Locations

Where installed on the surface of a wall, pole or other structure, the cable shall be enclosed in medium or heavy galvanised steel tube to AS 1074 or **APPROVED** galvanised steel cable guards from not less than 0.3 m below the ground to 2.4 m above.

The enclosure shall be of such size as to readily accommodate the complete wiring system which it protects and shall be securely attached. Steel fittings and screws shall be galvanised or stainless.

Note: Electro–tinned or cadmium plated steel fittings and screws are not acceptable for exposure to the weather or below ground level.

Where flexible conduit is required, the flexible conduit shall be continued to the highest point of attachment of the cable and shall be so arranged as to prevent the ingress of moisture.

Cables shall be placed in such a position that they are least liable to mechanical damage and shall not obscure a Distributor pole identification mark or number.

(b) Indoor Locations – Underground Reticulated Distribution

Double insulation of Underground Consumer's Mains shall be maintained between the Distributor Underground Reticulated Distribution system and the first electrical protective device (fuse or circuit breaker) within the installation and further shall be provided with substantial mechanical protection where placed on or in a building. For example, in a brick veneer or timber wall cavity, insulated and sheathed, unarmoured, cables shall be enclosed in heavy duty non–metallic conduit to AS 2053. (Double brick wall cavity would be exempt).

See Clause 5.4.3.2 regarding the need under certain conditions, for cable installations within buildings to be visible at the time of inspection.

(c) Distributor Pole on Property (Including Pole Type Substations)

A minimum safe working clearance from any live apparatus of 2.0 m shall be maintained by all persons and apparatus in personal contact therewith. If this clearance cannot be maintained, the DISTRIBUTOR SHALL be consulted before proceeding. See also Clause 5.4.1.1 which requires that certain substations be de–energised for safety and indicates certain poles which are unsafe to climb.

Drilling of concrete poles is **NOT PERMITTED** under any circumstances as ingress of moisture can lead to failure of the pole; hence, fixing of apparatus shall be effected by banding with suitable stainless steel bands. Multicore cables above 50 mm^2 shall be saddled to timber poles using approved type saddles, and fixed to concrete/steel poles with a stainless steel band, so arranged that the band will not directly compress on cable sheaths, but will securely attach cables to pole. In the case of a concrete pole carrying high voltage conductors, it may be necessary to provide additional insulation between the consumer's mains and the body of the pole or brackets attached thereto.

Where the maximum demand does not exceed 170 A per phase, the consumers mains shall be terminated by the REC on the Distributor pole 4.0 m above ground level (i.e. a FOLCB up to 100 A or a Fuse Switch Disconnector for supplies 100–170 A). The Distributor will provide and install the necessary cable, conduit, etc, for the connection from the Distributor's supply system to the Point of Supply.

Where the maximum demand exceeds 170 A per phase, the consumer's mains cable shall be of adequate length of conductor for connection to the service fuses or other appropriate apparatus of the Distributor's system as determined by the Responsible Officer.

The REC shall leave the cable, complete with its enclosure (if any), neatly attached to the pole not higher than 4.0 m above ground level. The cable ends shall be sealed to prevent ingress of moisture.

5.4.3.7 Customer's Pillars and Cubicles.

(a) General

For the purpose of these Rules a customer's pillar or cubicle is an enclosure installed on the customer's property for the purpose of terminating unmetered conductors. Subject to compliance with Section 6 (Metering) of these Rules, these enclosures may also contain a switchboard and/or metering equipment. Pillars or cubicles are supplied, installed and maintained by the customer.

A customer's pillar is a free standing enclosure with access from the sides and top and which incorporates a lift–off cover to gain access to the apparatus within.

A customer's cubicle is an enclosure where access to the apparatus within is usually available from the front or rear through a door or removable cover.

Customer's pillars, cubicles and their contents shall comply with the relevant requirements of the Wiring Rules and the following:

- Where a pillar or cubicle is required to accommodate a service protection or disconnection device, devices rated in excess of 100 A per phase should be designed to disconnect all phases of supply simultaneously when manually opened. Service protection devices and/or fuse links shall be of a type approved by the Responsible Officer. Refer to Clause 5.2 Service Protection Devices.
- Suitable connection devices (e.g. busbars or links) shall be provided for the termination of all active, neutral and earthing conductors of the Consumer's mains cables and the Distributor's Underground Service Cables.
  (The Responsible Officer shall be consulted regarding the size and type of service cable and method of termination).

- Pillars and cubicles shall be of robust construction. Doors and locking arrangements shall be designed to resist vandalism.
- Access to pillars containing service connection or protection devices only, may be effected by removal of a lift–off cover which shall have locking and securing facilities above ground level for attachment of a padlock supplied by the Distributor. Refer to Clause 5.2.2.
- Access to cubicles containing service connection or protection devices only, shall be by a removable panel or door provided with facilities for locking or sealing by the Distributor as approved by the Responsible Officer. Any removable panel not hinged shall be designed to prevent inadvertent contact with live parts when removing the panel.
- Any pillar or cubicle containing a customer's switchboard, fuses or an Electricity Supplier meter shall in addition to the access provided for above, be provided with a lockable hinged door fitted with a "Power Industry Lock" or other approved locking device. (Refer to Clause 1.10.) This door when opened shall not expose any live parts.
- The sealing and locking facilities of Clause 6.3 shall apply for pillars and cubicles.
- Pillars exposed to the sunlight shall be suitably protected against the effects of ultra–violet radiation. Refer to Appendix A for specification of fibreglass enclosures for pillars and cubicles.
- The electrical apparatus contained within the pillar or cubicle shall be capable of carrying the Calculated Maximum Demand and shall have a fault rating suitable for the magnitude of supply.
- All steel parts shall be galvanised to AS1650 or provided with other forms of protection to prevent corrosion. All welding shall conform to AS1554.1.
- **Where particular pillars and cubicles are intended to be marketed throughout Victoria their designs should be forwarded to the Convenor, Service and Installation Rules Working Group for approval (refer to Foreword for the mailing address).**

(b) Covers of Pillars:

Covers of customer's pillars shall comply with the following:

- The cover shall be totally removable from the base to allow full access to the contents.
- The cover shall be ventilated with a weather–proof air vent having a a minimum area of 1800 mm^2 and providing a degree of protection of IP33 to AS 1939.
- The cover shall be clearly labelled to indicate it contains electrical apparatus, e.g. **ELECTRICITY** – 32 mm high letters. Refer to Clause 1.9 – Labelling.
- The cover shall be non–moisture absorbing and have a high impact resistance.
- The cover shall be constructed of fire–retardant material or be treated to prevent the spread of fire.
- Any live parts exposed when the cover is removed (e.g. bare studs) shall be protected by a shroud extending over the top and below such live parts. This shroud shall be designed to prevent inadvertent contact with live parts during removal of the cover.

(c) Space required inside Pillars and Cubicles for Termination of Distributor Cables:

Adequate space shall be provided inside the pillar or cubicle for termination of the Distributor's Underground Service Cable and the consumer's mains. This space requirement will vary according to the size of the cables and the equipment to be installed inside the pillar or cubicle. Access to effect Distributor terminations should not be restricted by the design of the contents of the pillar or cubicle.

The minimum clear space required inside a **pillar** for termination of a Distributor's Underground Service Cable is shown in Fig 5.2.

The minimum clear space required inside a **cubicle** for termination of a Distributor's Underground Service Cable/s is shown in Fig 5.3 or 6.35.

This space is measured from where the cable enters the pillar or cubicle to the point where the Underground Service Cable/s attaches to the customer's termination device (service protection device, busbar, etc) and does not include the equipment itself.

(d) Access to Pillars and Cubicles:

Access to customer's pillars and cubicles shall comply with the following:

- Pillars and cubicles shall be located to provide ready access for maintenance of the equipment contained therein.
- For **pillars**, in general, a minimum clear space of 900 mm shall be maintained on three sides for access, but this may be reduced to 600 mm on any side which does not require access to operate or replace any equipment.
- For **cubicles**, in general, a clear space of 900 mm shall be maintained in front of any access door or panel. Refer to Section 6 of these Rules for space required for access to metering equipment (also refer to the Wiring Rules regarding space in front of switchboards).
- Consideration should be given to the construction of boundary fences and landscaping when locating the pillar or cubicle.
- Pillars and cubicles shall be protected by suitable barriers to prevent damage from vehicular traffic where necessary.

5.4.3.8 Cable Terminations, Joints and Sundry Materials

(a) General

All materials and methods used shall be to the satisfaction of the Responsible Officer.

Conductors shall be colour coded or otherwise marked to clearly and permanently identify each incoming active conductor and the neutral conductor. In the case of polyphase supplies, the active conductors shall be clearly and permanently identified to indicate each phase, i.e. red, white, blue. Any identification as required above shall be located at a position on the cable not likely to be removed when the cable is stripped for termination.

Where heat shrinkable tubing is to be applied to cable ends, the tubing shall be appropriately coloured to indicate the above.

Where the conductor core of a double insulated cable is to be changed in polarity, e.g. red coloured core to be used as a neutral, the cable shall be sleeved with heat shrinkable tubing of appropriate colour over the conductor core for a minimum length of 600 mm or to the entire stripped length whichever is the greater. This shall consist of a minimum layer of medium wall heat shrinkable tubing or two layers of thin wall heat shrinkable tubing.

Note: The neutral conductor shall be coloured black.

(b) Termination at Building (or "Load") End

At the building (meter box) end of the cable, the cable cores or conductors shall be prepared in accordance with Section 6 and shall be separated and insulated as necessary to be ready for connection to the Distributor's apparatus.

Note: Where supplied from Underground Reticulated Distribution, and where a metallic enclosure is employed, particular attention to additional insulation and the earthing requirements of the Electricity Safety (Installations) Regulations is necessary to the length of consumer's mains between the Consumer's Terminals and the first electrical protective device (fuse or circuit breaker).

Refer to Figure 5.9 – Insulation Requirements for Cable Cores of Consumer's Mains used in URD at Building (or "Load") End.

(c) Pit at Point of Supply

Where the Determined Maximum Demand does not exceed 100 A per phase and the nominated Point of Supply is a pit, the REC shall install the consumer's mains cable complete with enclosure, into the pit. The cable end(s) shall be sealed to prevent the ingress of moisture and shall extend to a minimum of 1.0 m above the lid of the pit. The cables for each installation shall be tied together, identified with a permanent water resistant tag at 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. The lid of the pit shall be replaced.

Cables greater in size than 50 mm^2 shall not enter a standard pit. Consumer's Mains within the pit shall be single–core insulated and sheathed stranded copper conductor or individual cores of multi–core cable, including neutral screened cable, suitably sheathed with insulating material as shown in Figures 5.10, 5.11 and 5.12.

In the event that no pit abuts the property boundary, the Responsible Officer **SHALL** be consulted. REC's are not permitted to open above ground Distributor pillars, cabinets, etc, unless specifically authorised to do so in a particular case.

(d) Other Arrangements

The termination of Underground Consumer's Mains within Distributor substations, or in circumstances other than specified above, shall be as detailed by and to the satisfaction of the Responsible Officer.

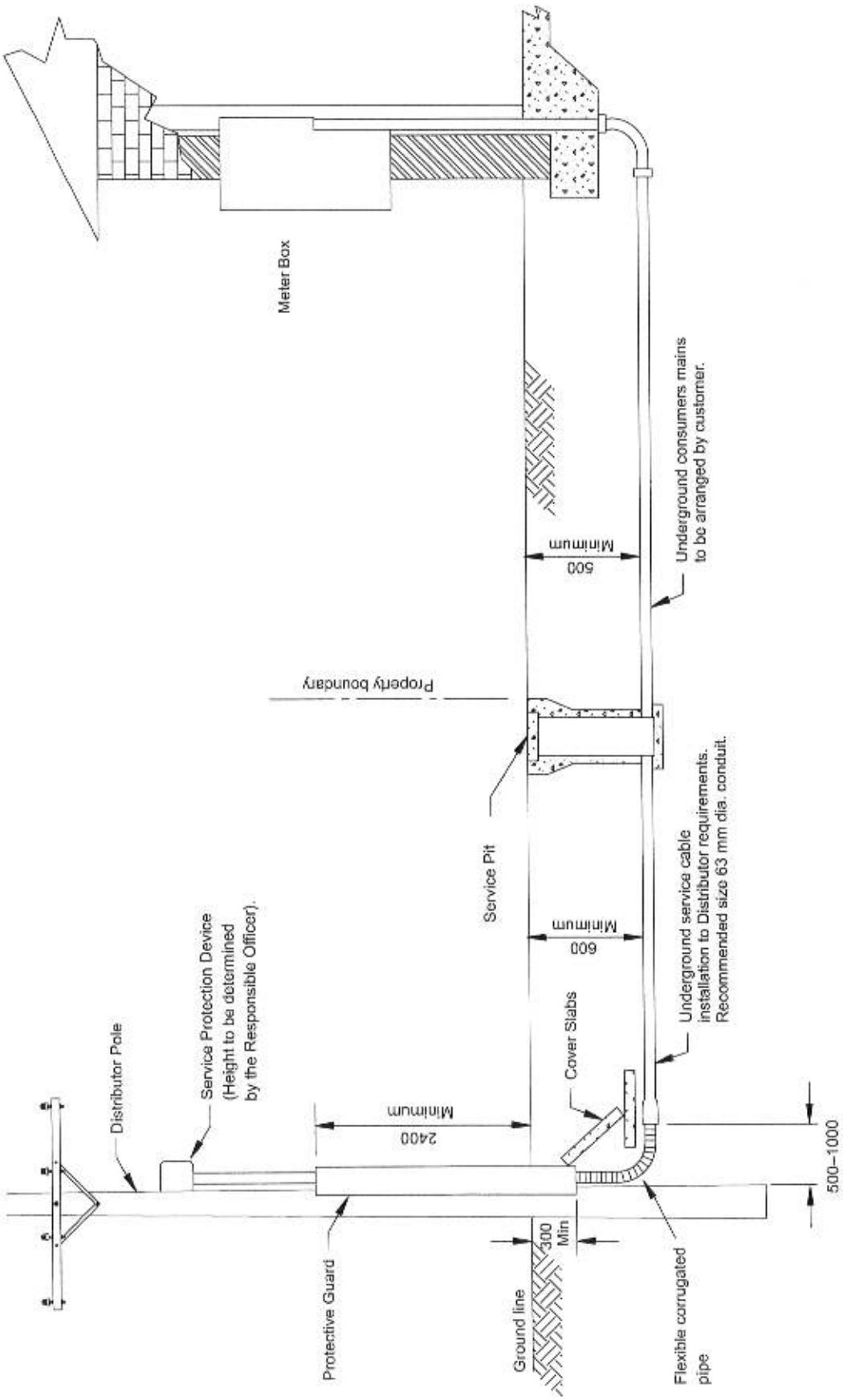
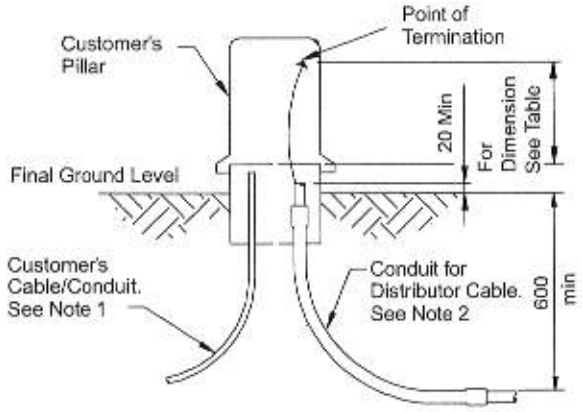
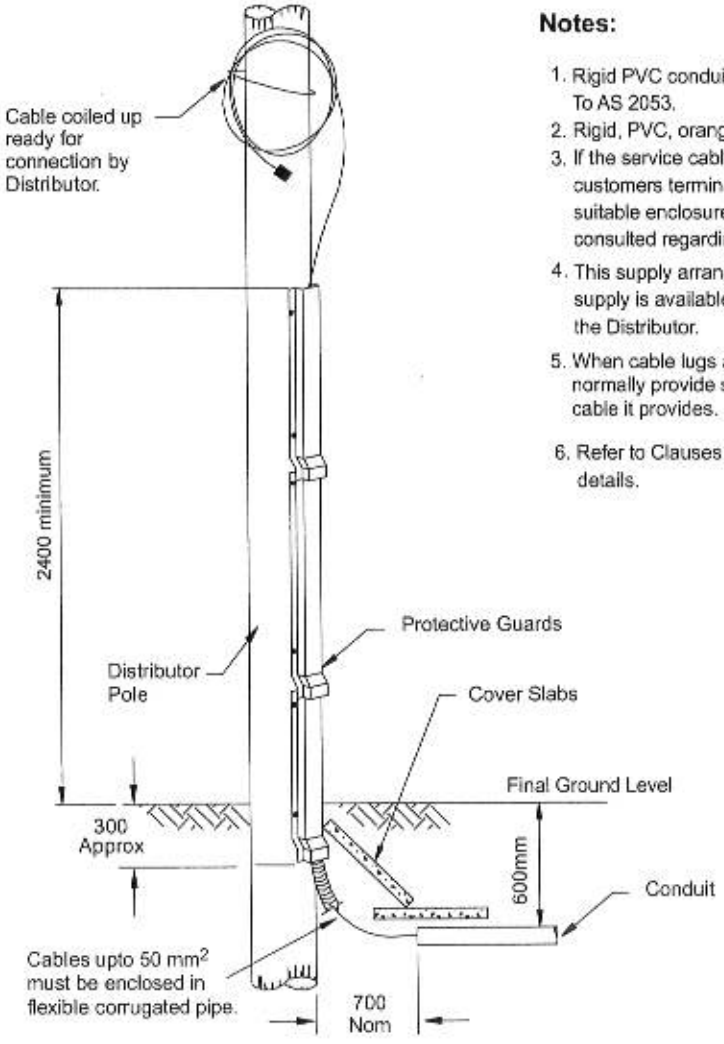


Figure 5.1 Typical Underground Service Cable & Consumer's Mains – Pole and Pit Detail



Distributor cable size	Min. clear space between service cable entry and terminating device	Recommended conduit size for Distributor cable
35 mm² CU XLPE	260mm	63mm
50 mm² CU XLPE	260mm	80mm
185/240 mm² ALUM. 4 CORE	360mm	100/150mm

Customer's Pillar Detail

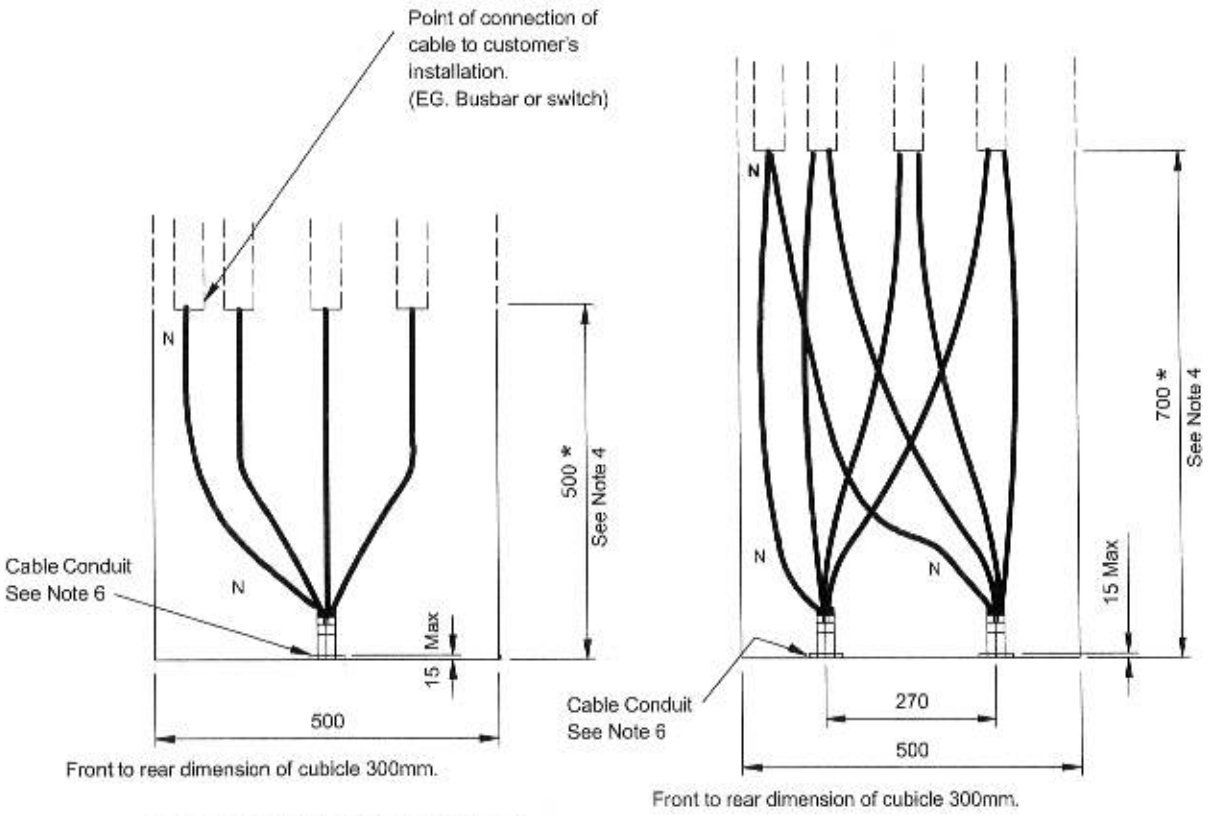


Distributor Pole Detail

Notes:

1. Rigid PVC conduit, underground, orange, heavy duty To AS 2053.
2. Rigid, PVC, orange, large sweep bend to AS 2053.
3. If the service cable is to be terminated at the customers terminals in a switchboard or other suitable enclosure, the Responsible Officer should be consulted regarding the method of termination.
4. This supply arrangement assumes that adequate supply is available and has been negotiated with the Distributor.
5. When cable lugs are required, the Distributor will normally provide standard cable lugs for the service cable it provides.
6. Refer to Clauses 5.4.3.7. and 5.4.3.8. for further details.

Figure 5.2 Typical U/G Service From O/H Distribution – Pole and Pillar Detail

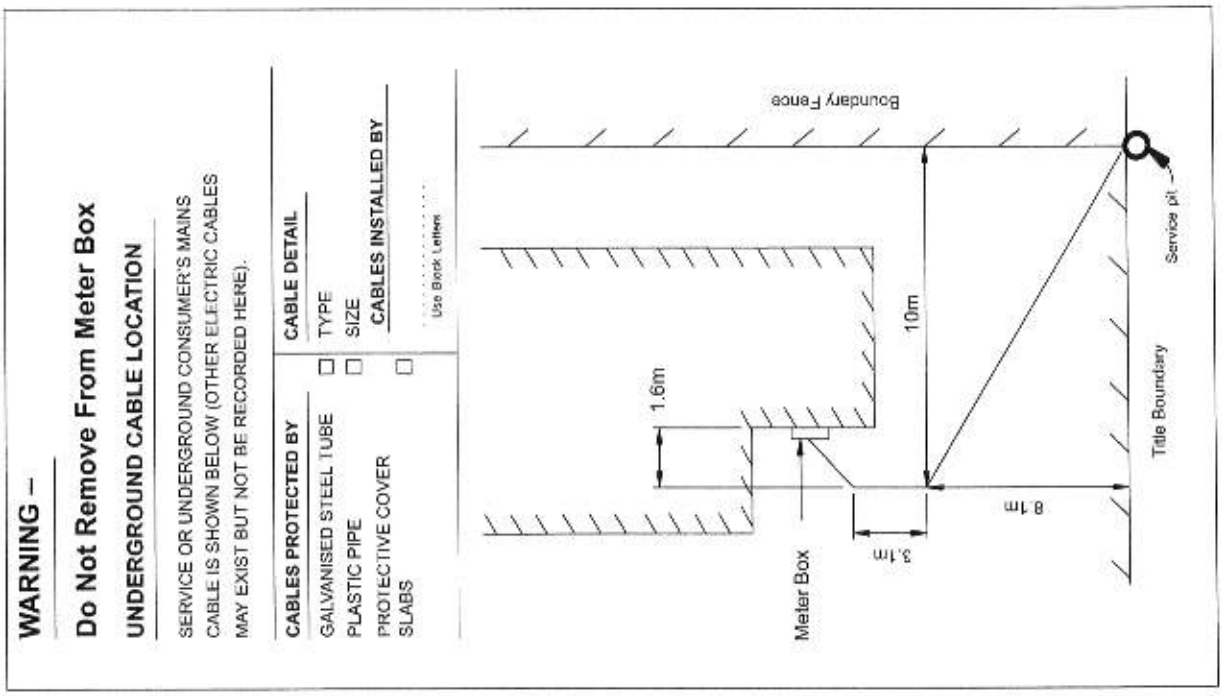


NOTES

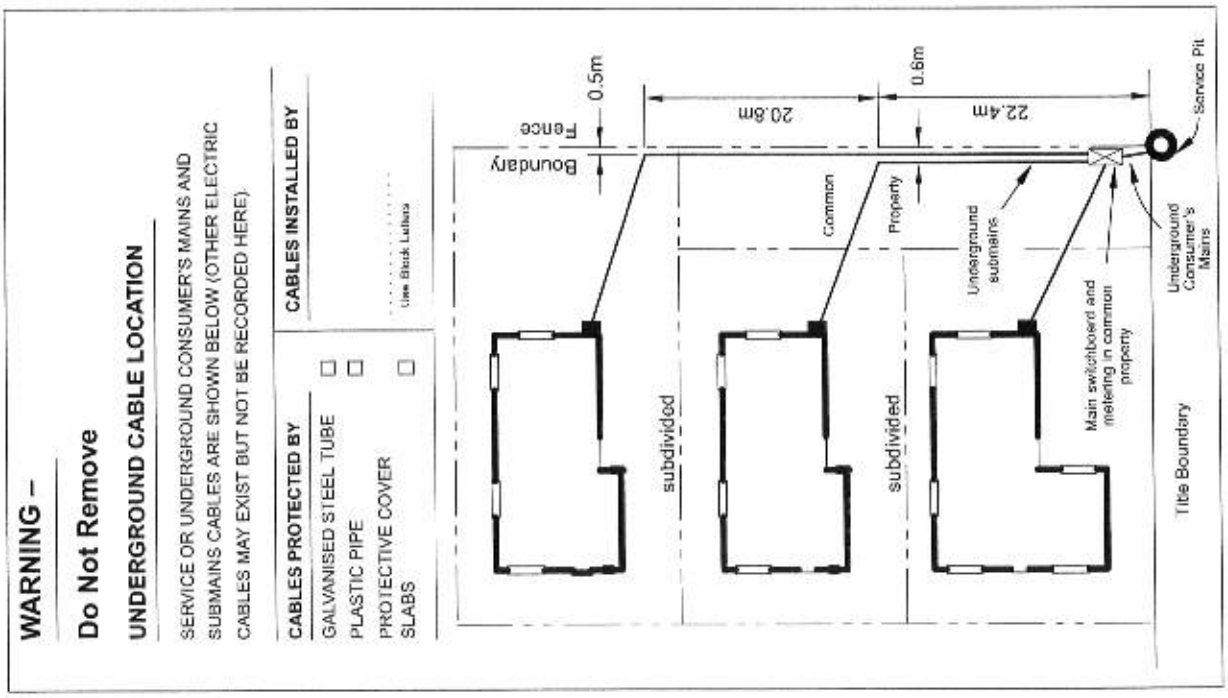
1. The dimensions shown are the minimum required for termination of the cable, and connection to the customer's busbar or switch.
2. Before construction of the switchboard or cubicle is commenced, the contractor/customer should check with the Distributor regarding the size and number of cables to be installed to determine the minimum space required.
3. Dimensions shown are for multi core cables up to 240mm^2 4 core solid sector aluminium conductors.
4. For DMDs up to 170 Amps per phase (50mm^2 cable or less) the dimension shown * may be reduced by 250mm.
5. The cable termination enclosure shall have provision for sealing against unauthorised access.
6. Where cables are installed in conduit, the conduit shall be H.D. orange electrical to AS2053.
7. For DMDs up to 170 Amps per Phase the minimum conduit size shall be 80mm Dia. Bends shall be 90 degree large sweep type. For DMDs above 170 Amps Per Phase (185/240mm^2 cable), the minimum conduit size shall be 100mm Dia. Bends shall be large sweep (min radius 760mm).
8. When cable lugs are required, the Distributor will normally provide standard cable lugs for service cable it provides.

Figure 5.3 Dimensions for Cable Terminations in Customers' Cubicles or Switchboards for Terminating Distributor's Service Cables

SINGLE INSTALLATION

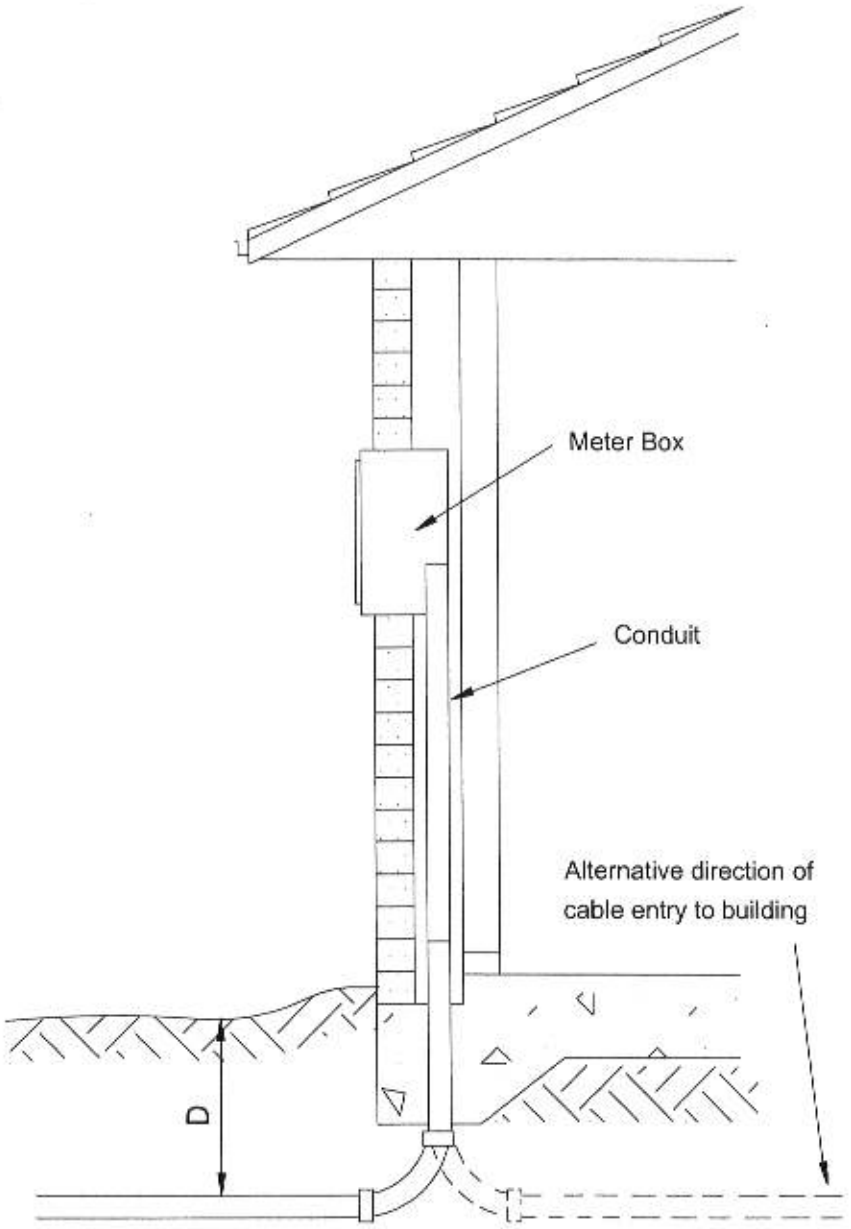


MULTIPLE INSTALLATION



NOTE: Refer to Clause 5.4.3.1(b) regarding recording of underground cables for large multiple installations.

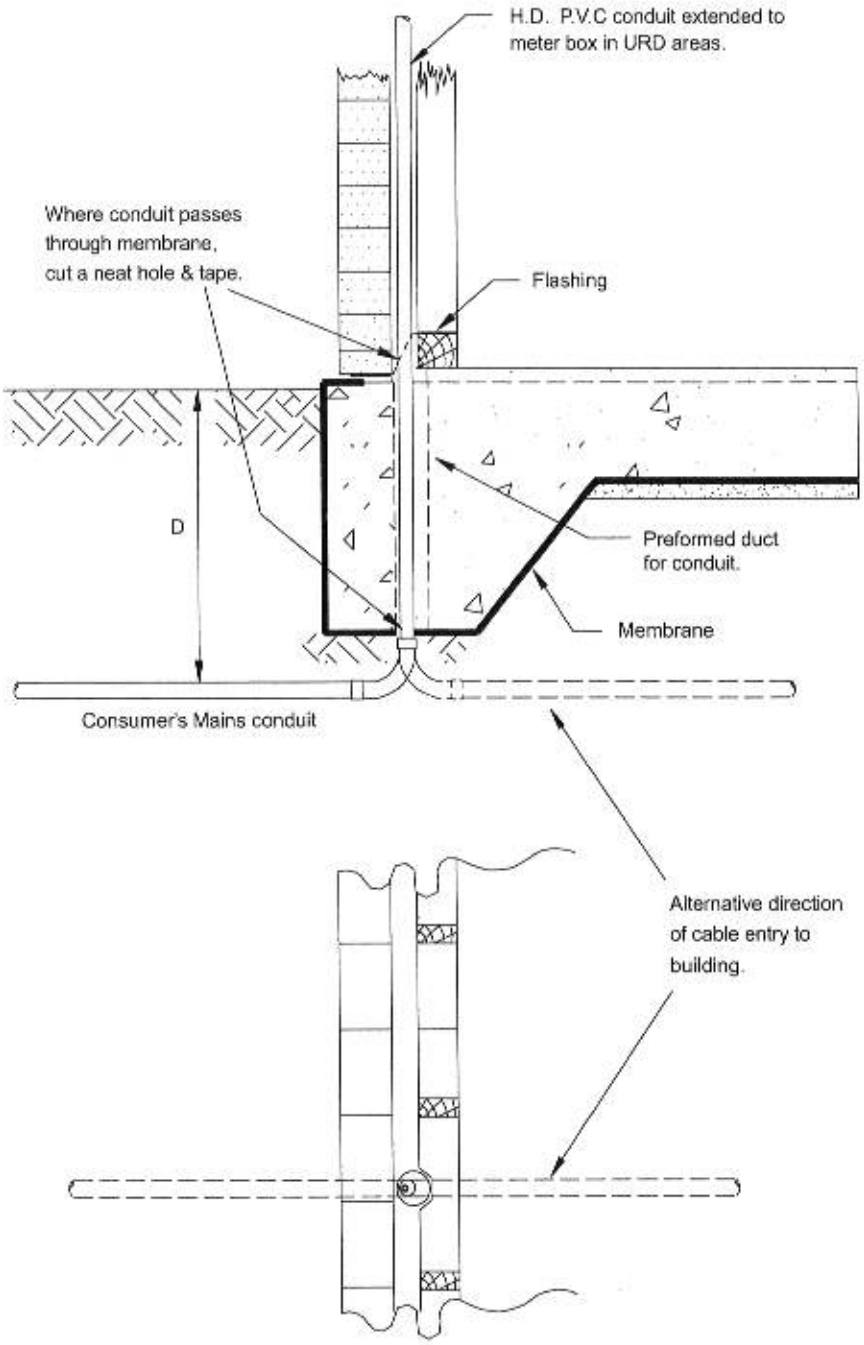
Figure 5.4 Customer's Cable Location Record Cards



Notes

1. Dimension 'D' shall not be less than the minimum depth of cover specified for the particular wiring system employed. Refer Clause 5.4.3.5(a).
2. In U.R.D. Supply Areas:
   Increased mechanical protection from ground to meter box required in all cases – Refer Clause 5.4.3.6(b).
   Length of cable above ground level shall be the practicable minimum – Refer Clause 5.4.3.1(e).
3. Where no provision has been made for entry through footing, refer to Clause 5.4.3.1(d).
4. **Care must be taken to arrange underground cable enclosures in such a manner as to prevent moisture entering the building via the enclosure; particularly where a pit is installed at a higher level than the entry to the building.**

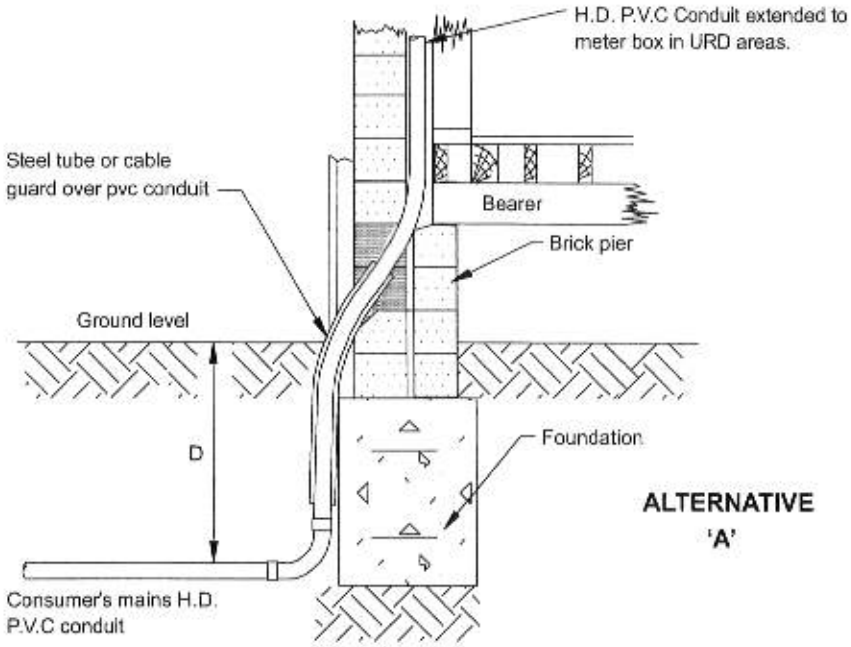
Figure 5.5 Cable Entry to Building



PLAN VIEW

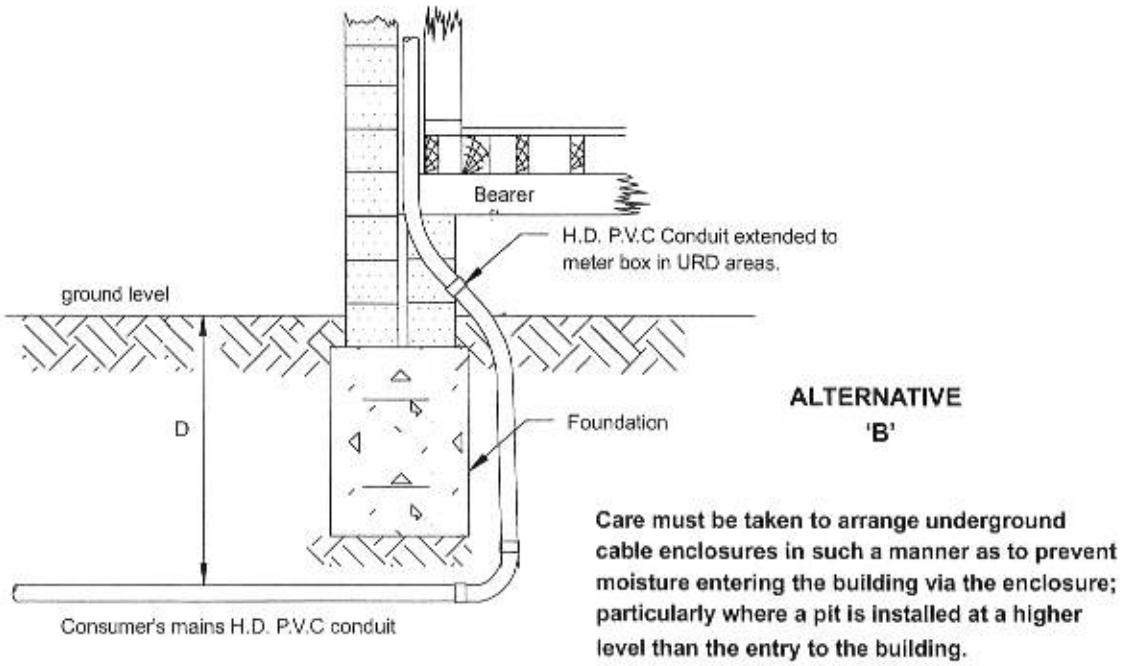
Care must be taken to arrange underground cable enclosures in such a manner as to prevent moisture entering the building via the enclosure; particularly where a pit is installed at a higher level than the entry to the building.

Figure 5.6 Cable Entry Details



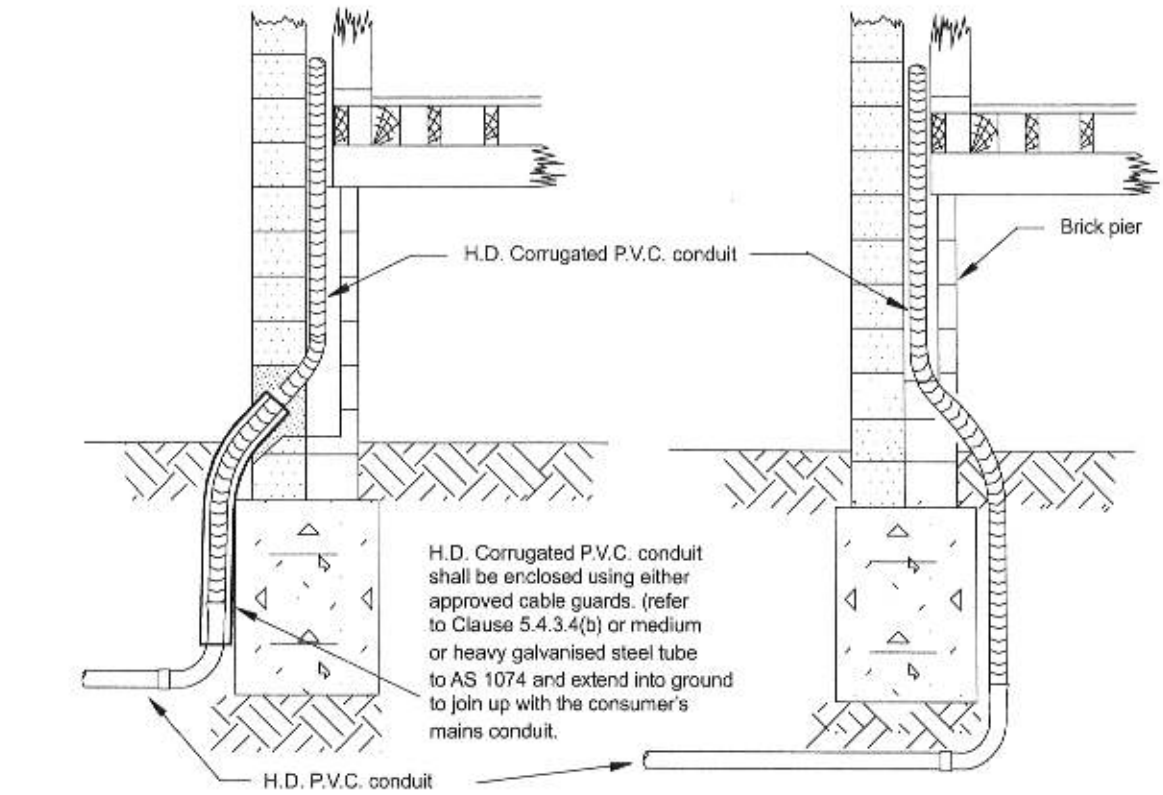
NOTE:

Dimension 'D' shall be not less than the minimum depth of cover specified for the particular wiring system. Refer Clause 5.4.3.5(a).



Care must be taken to arrange underground cable enclosures in such a manner as to prevent moisture entering the building via the enclosure; particularly where a pit is installed at a higher level than the entry to the building.

Figure 5.7 Alternative Cable Entries to Building



NOTES:–

1. Corrugated P.V.C conduit shall be orange in colour and shall be installed in accordance with the requirements of the Electricity Safety (Installations) Regulations.
2. Care must be taken to arrange underground cable enclosures in such a manner as to prevent moisture entering the building via the enclosure: particularly where a pit is installed at a higher level than the entry to the building.
3. Diagrams are not to scale.

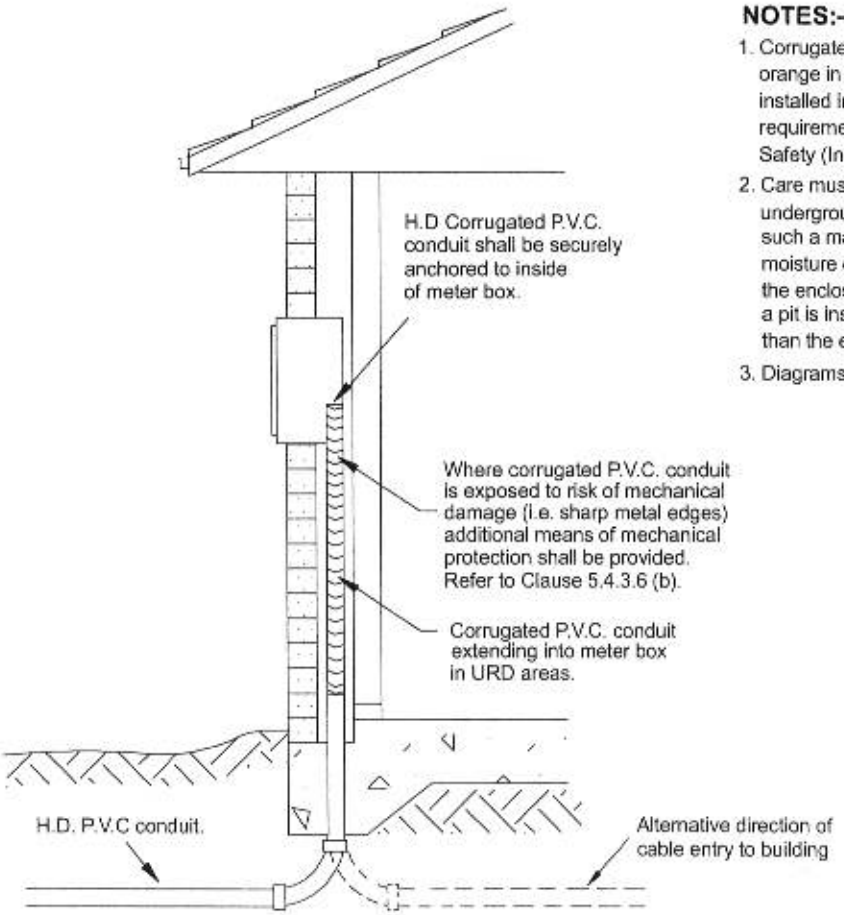


Figure 5.8 Alternative Cable Entries to Building Using Corrugated Conduit

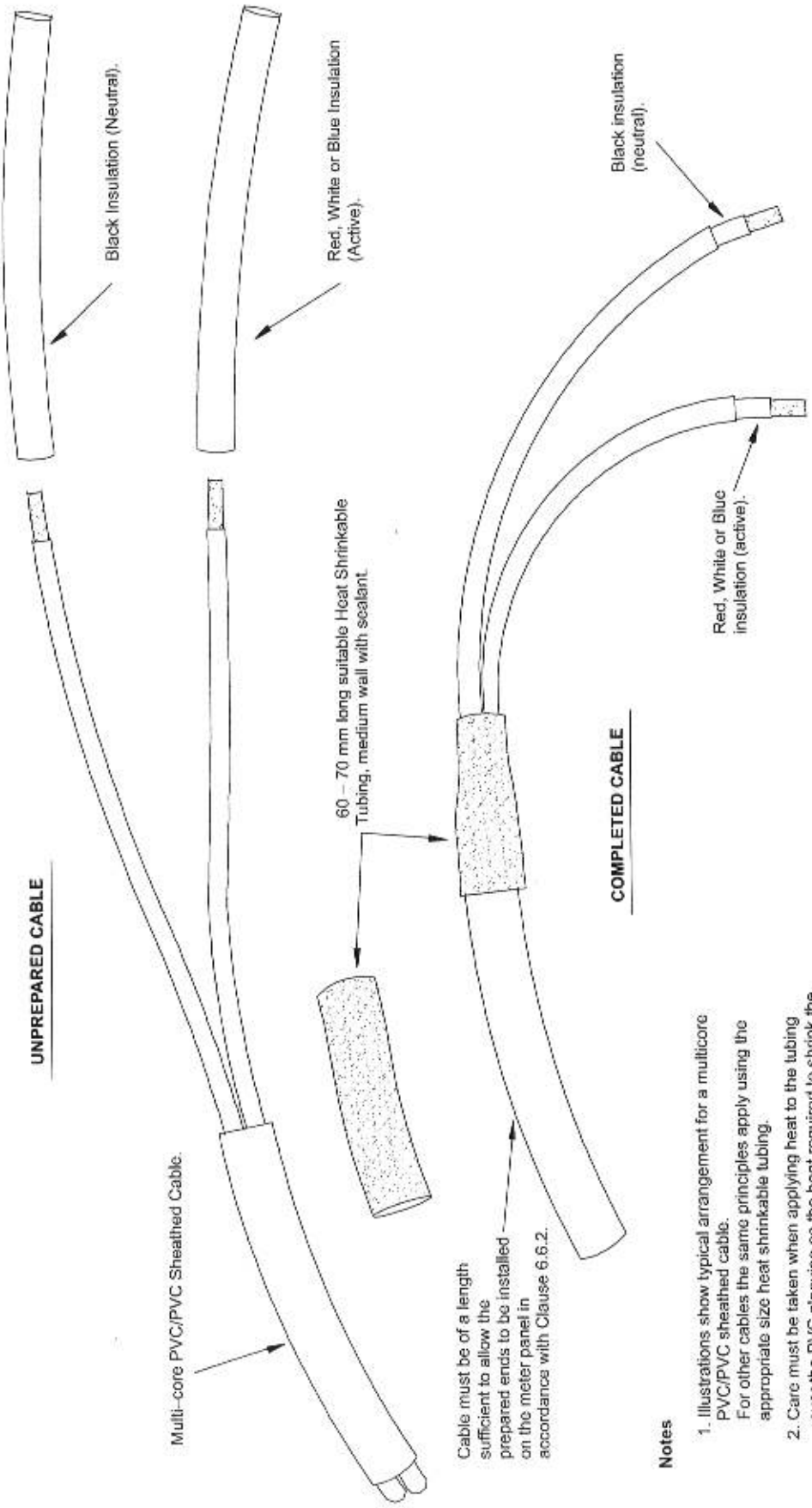
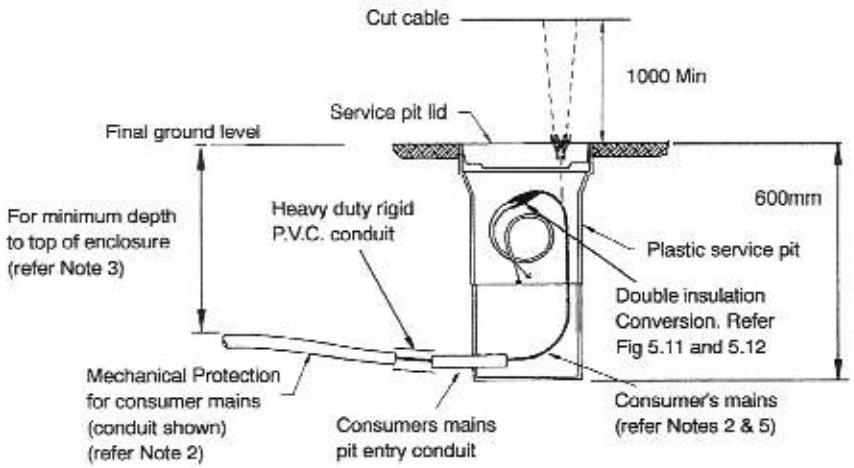
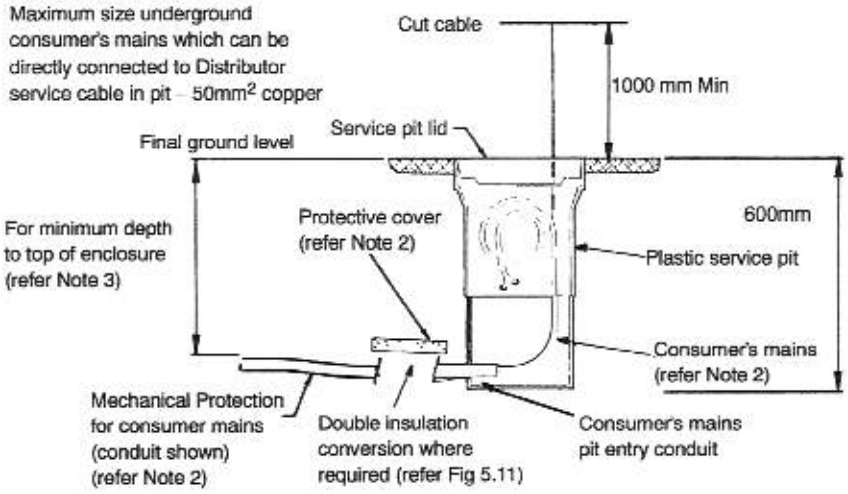


Figure 5.9 Insulation Requirements for Cable Cores of Consumer's Mains Used in URD Areas at Building (or "Load") End



Detail A Multi-core – (up to 16mm^2) Consumer's Mains



Detail B Multi-core – (above 16mm^2) Consumer's Mains

NOTES:

1. **WARNING – Cables in pit are live and LIEW's shall adopt safe working practices while carrying out any work in the pit.**
2. In these drawings particular approved items are shown, however the use of other materials may be permissible in accordance with Note 3 below.
3. Consumer's Mains (type of cable and installation requirements) shall be in accordance with Clause 5.3 and 5.4 of these Rules.
4. The Distributor service cable has been omitted from these drawings for clarity.
5. To provide the double insulated tails for multi-core (insulated and sheathed) Consumer's Mains up to 16mm^2 it is permissible to prepare the cable for connection in the pit at a point one metre from the end of the Consumer's Mains (refer Figure 5.12).
6. To provide the double insulated Consumer's tails for multi–core cable (greater than 16mm^2) the reconstruction of the Consumer's Mains shall be made at the base of the pit (refer Detail 'B' and Figure 5.11).
7. Heat shrinkable tubes applied to provide double insulated tails shall comprise one continuous length from conversion point to core ends.
8. **The maximum size of the double insulated tails which can be accommodated in the pit is 50mm^2.** Where Consumer's Mains need to be greater than this size (e.g. volt drop considerations), the cable must be reconstructed outside and adjacent to the pit to provide 50mm^2 or less double insulated tails in pit. Where customer's Determined Maximum Demand (DMD) is greater than 100 amps, consumer's mains cable shall be terminated in a pillar or cubicle supplied by the customer or on customer's switchboard unless otherwise approved by the Distributor's Responsible Officer (refer Clause 5.4.1.3.)
9. LIEW's shall –
   - A Lift service pit lid;
   - B Push Consumer's Mains through pit entry conduit into pit (LIEW shall not pull Consumer's Mains or draw wire through the service pit);
   - C Cut Consumer's Mains a minimum of 1000mm above final ground level, convert if necessary and seal end to exclude moisture (refer Note 5);
   - D Coil Consumer's Mains in pit, and
   - E Replace service pit lid.
10. Details for preparation of neutral screened and multi–core cables in service pit (refer Figure 5.12).

Figure 5.10 Service Pit – General Arrangement

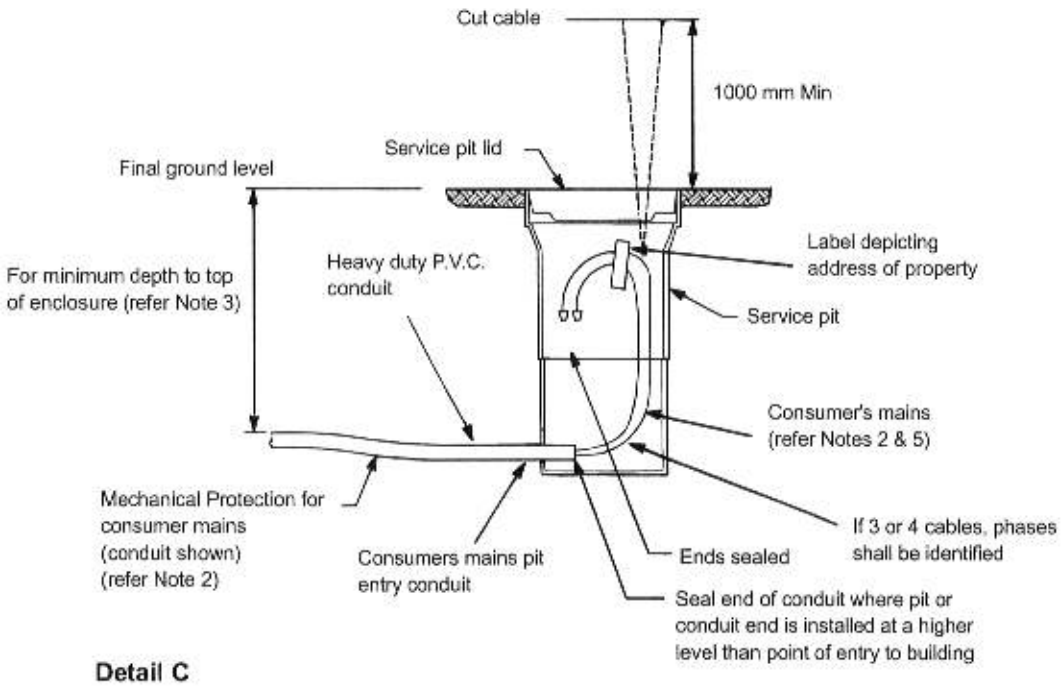
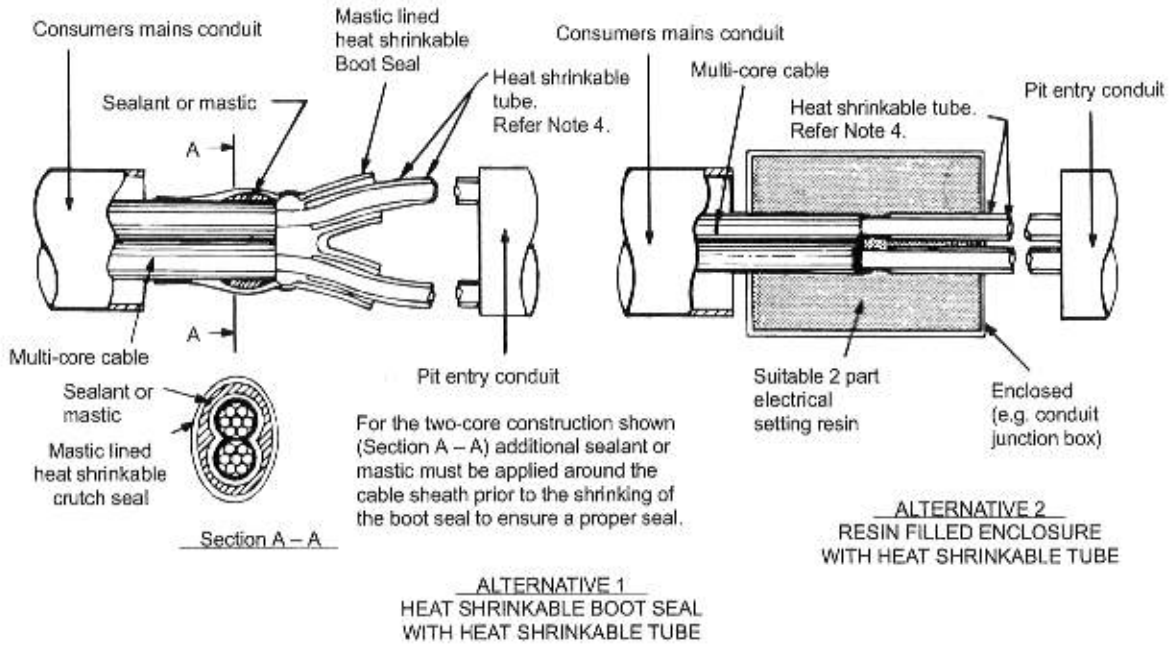


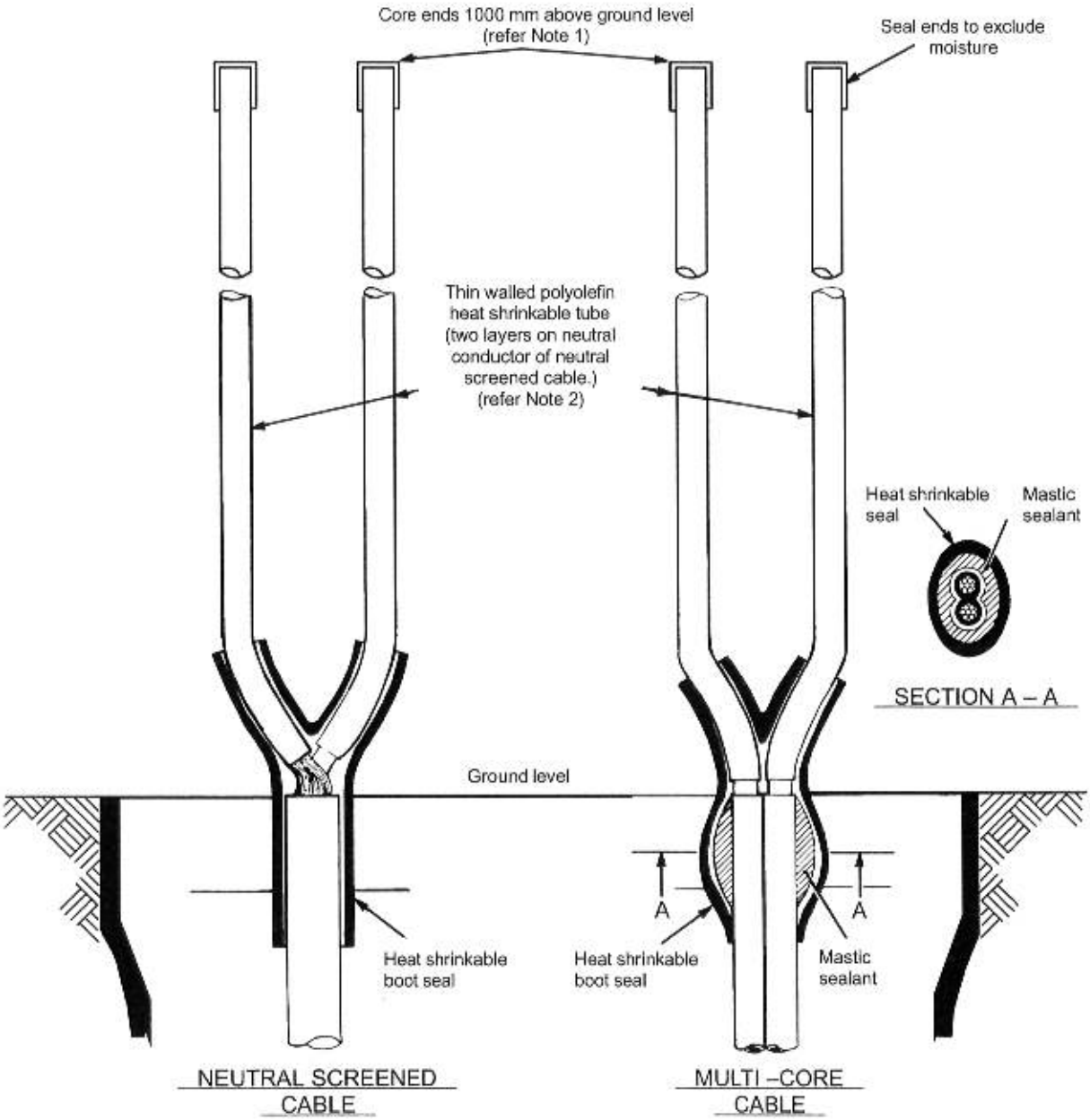
Figure 5.10/1 Service Pit – Single Double Insulated Consumer's Mains up to 50 mm^2



NOTES:

1. Alternatives 1 & 2 are two methods approved by the Distributor. Other methods may be accepted, however, prior approval from the Distributor shall be obtained.
2. The methods represented above show the reconstruction of the consumer's mains outside the pit. For up to 16mm^2 multi-core cable, this can be applied inside the pit (refer to Figure 5.10) however, only the heatshrink method would be acceptable at this point.
3. The discontinuity in the conduits shown above will require further mechanical protection, e.g. concrete cover slabs.
4. Heat shrinkable tube to extend for full length of cable in the pit. Refer to Clause 5.4.3.8(a) for colour coding of multi-phase supplies.
5. Heat shrink tubings shall be flame retardant polyolefin with minimum recoverable wall thickness to Distributor requirements.

Figure 5.11 "Double" Insulation of Consumer's Mains at Pit



NOTES:

1. All Consumer's Mains cores shall have a minimum length of 1000 mm above ground level.

   For Builder's Supply Consumer's Mains, the core ends may extend to a maximum of 2000 mm above ground level.

2. Heat shrink tubings shall be flame retardant polyolefin with minimum recoverable wall thickness to Distributor requirements.

3. Refer to Figure 5.10 for Consumer's Mains greater in size than 16 mm^2.

4. Heat shrinkable tube to extend for the full length of stripped cable in the pit. Refer to Clause 5.4.3.8(a) for colour coding of conductors.

Figure 5.12 Preparation of Underground Consumer's Mains up to 16 mm^2 in Service Pit

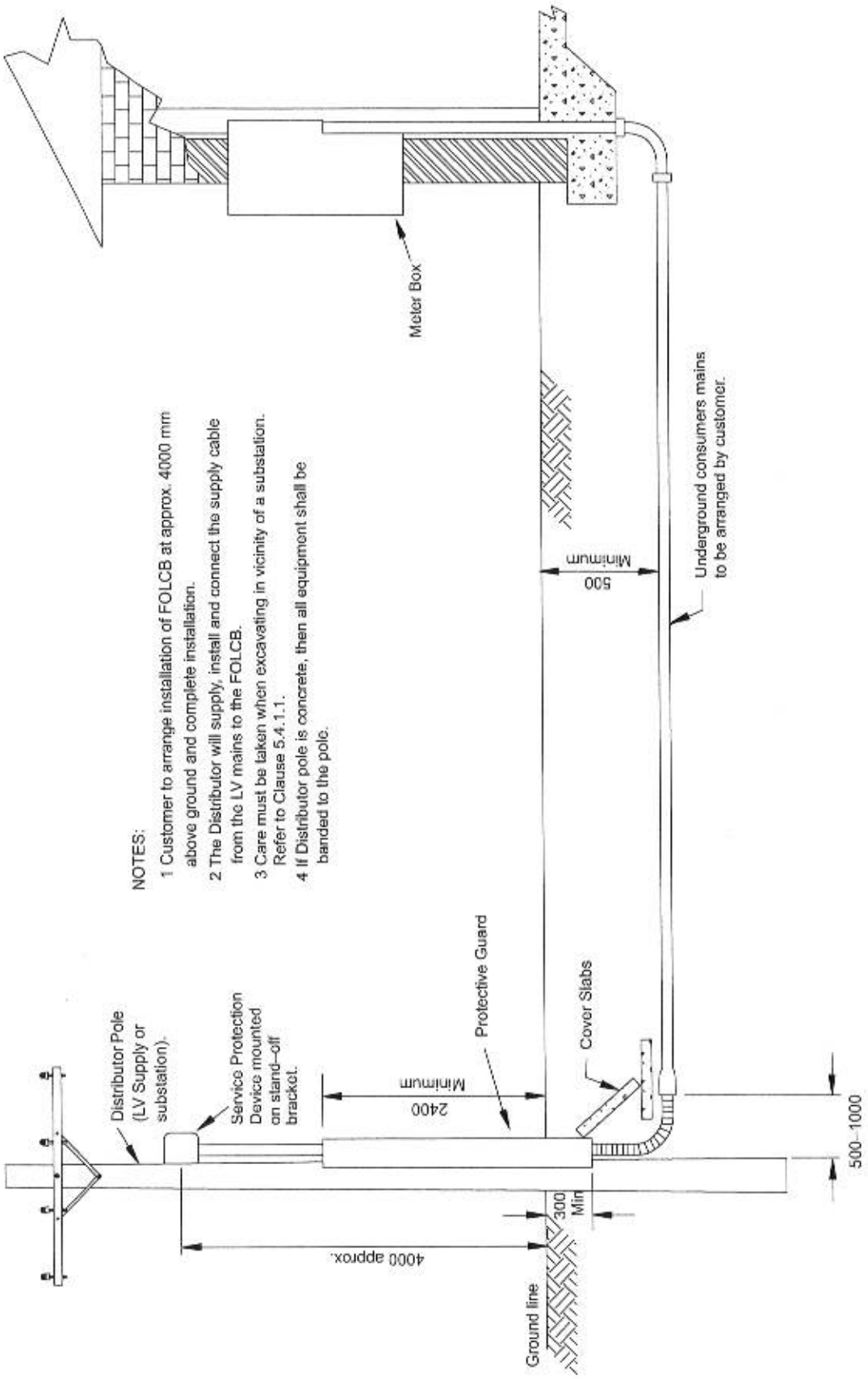


Figure 5.13 Typical Underground Consumer's Mains Cable – Distributor Pole or Substation on Customer's Property

5.5 Overhead Supplies

5.5.1 Aerial Service Cables

5.5.1.1. General

Where Clauses 5.1.1 & 5.1.2 and conditions permit supply by an aerial service cable, and the Determined Maximum Demand does not exceed 170 A, the customer may choose this method of supply instead of an underground supply subject to the relevant Distributors agreement.

Where an overhead supply is agreed and is chosen or exists, the customer shall make provision for the installation of the aerial service cable in accordance with the clearances required by the Electricity Safety (Network Assets) Regulations and these Rules, and to the satisfaction of the relevant Distributor.

The Distributor may install a span of aerial service cable with a maximum length of 45m from the distributors pole to a point of attachment located within 20m of the customer's property boundary provided all clearances detailed in Figures 5.14(a), 5.14(b) and 5.15 can be achieved and maintained and all other provisions of this rule are met.

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 this rule can not be achieved or are not maintained.

5.5.1.2 Point of Attachment (POA)

The POA of an aerial service cable to a customer's installation shall be selected in accordance with this clause and the details provided in Figures 5.14(a), 5.14(b) and 5.15 and shall be accessible from a portable extension ladder.

Wherever possible, the POA shall be selected to avoid the necessity for the service cable to cross over roads, driveways, areas where vehicles may traverse, roofs, structures and adjacent properties. In addition, unless a more appropriate location is available, the POA 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 prescribed clearances.

The relevant Distributor shall be consulted in the following situations where:

- There is a substantial electrical load;
- An installation on a corner allotment has potential to be serviced from either street;
- The service may cross the boundary of an adjacent property;
- 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;
- The required clearances and provisions of this section may not be achieved or maintained.

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.

5.5.1.3 Fixing of Aerial Services Cable at POA

The customer shall provide and install a suitable service bracket having adequate fixing at the POA for an aerial service cable.

Service brackets shall have an installed safe working load capacity of 1kN for two wire service cables and 2kN for all other service cables at all angles up to 60 degrees from the centre line of the bracket.

The load rating of commercially available service raiser brackets is marked on the bracket, and the bracket shall be installed in accordance with the manufacturer's instructions.

Where a raiser bracket does not have a readily identifiable load rating, and/or where doubt exists as to the service bracket's installed working load, the relevant Distributor may require evidence of the bracket's suitability for use. This may be demonstrated by provision of the bracket's installed design computations certified by a qualified structural engineer to the relevant Distributor.

All service brackets shall be hot dipped galvanized after fabrication to AS 4680 or provided with an equivalent protection. All service raiser brackets shall conform to Clause 5.5.1.6. "VESI Specification for Service Raiser Brackets and their Installation".

A range of suitable commercially available brackets and fixing arrangements are shown in Figures 5.16, 5.17 and 5.18.

5.5.1.4 Clearances of Aerial Service Cables

The minimum clearances of all new and replacement aerial service cables above and from ground, structures or objects shall be as detailed in Figures 5.14(a), 5.14(b) and 5.15 unless otherwise agreed between the relevant Distributor and the Office of the Chief Electrical Inspector. Clearances in excess of the minimum clearances specified by the current Electricity Safety (Network Assets) Regulations may be utilised in situations not covered by Tables 5.14(a), 15(b) and 5.15.

Clearances from trees or vegetation on the customer's property shall not be less than that specified in the current Code of Practice for Electric Line Clearance (Vegetation).

5.5.1.5 Failure to Provide or Maintain Minimum Prescribed Clearances

The prescribed minimum clearances from ground, structures, objects, trees or vegetation on the customer's property must be achieved and maintained by the customer from any aerial service cable that supplies the property and is installed in accordance with Clause 5.5.1.4. or previous service cable installation specifications.

The customer is responsible to ensure that buildings, structures, trees and landscaping, etc, on the property, do not impede or intrude on minimum clearances of the aerial service cable supplying the property.

The Electricity Safety (Network Assets) Regulations 1999 require the height of new and replacement aerial service cables over driveways and ground traversable by vehicles be a minimum of 4.6m at any time. New connections must meet and maintain this requirement.

Where an existing aerial cable is to be replaced due to customer initiated works and the customer is unable to provide facilities for the replacement 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.

Alternatively, where the customer proposes and the Distributor agrees to install a service pole or mid-span service or provide other works to gain the required height within the property for the replacement of an existing overhead service cable, the customer will be required to pay the cost and maintenance of such works.

The Distributor will make arrangements with the customer for clearances prescribed in Clause 5.5.1.4 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 minimum clearances of trees or vegetation within their property as prescribed in Clause 5.5.1.4 from any aerial service cable supplying the property, the Distributor may clear those trees or vegetation in accordance with the current Electricity Safety Act and Code of Practice for Electric Line Clearance (Vegetation) at the customers 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. Refer Clause 5.4.2.2.

5.5.1.6 VESI Specification - Service Raiser Brackets and their Installation

a) Definition

For the purpose of this specification a service raiser bracket is defined as a 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.

b) Strength Rating

Brackets shall have a minimum safe working load (SWL) of 1kN or of 2kN or of such higher value as specified by an Electricity Distributor.

c) Factor of Safety

The bracket shall be tested to twice the safe working load of the bracket without permanent deformation.

d) Fixing of Bracket

The bracket shall be rigidly fixed in such a manner that when a force of the magnitude and direction described in paragraph e) "Determining Bracket Strength" is applied to the bracket the permanent horizontal deflection of the bracket at the point of application of the force shall not exceed the lesser of 5% of the free length of the bracket or 50mm (in the case of longer brackets). Such deflection shall be due only to the permanent deformation of the fixing or the structure to which the bracket is fixed. No permanent deformation of the bracket is permissible.

The "free length of the bracket" is the length of bracket between the point of attachment of the service cable and the uppermost point at which the bracket is attached to the structure.

e) Determining Bracket Strength

Fracture or permanent deformation of the bracket shall not occur when a horizontal force equal to the SWL multiplied by the appropriate factor of safety is applied throughout the arc from 60^0 each side of the normal. The bracket shall be fixed to a structure of a type and in a manner similar to that which will be used when the bracket is in service. The force shall be applied at the point at which the service cable would normally be attached to the bracket.

f) Marking of Strength Rating

Brackets which are available commercially shall be clearly and permanently marked with their strength rating (SWL). This marking shall be readily visible with the bracket in service.

g) Corrosion Resistance

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

h) 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. The connection box mounting plate shall not protrude beyond the edge of the connection box.

The bracket shall be constructed 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.

i) Provision for Earthing

Each raiser bracket shall provide a flag terminal with a hole able to accept a M10 hot dipped galvanized bolt, washers and nut for connection of a bonding cable.

Bonding cables if supplied with the raiser bracket shall be 16 mm^2 green or green/yellow insulated copper cable and be connected to the bonding connection of the service attachment fitting / raiser bracket using a copper crimp lug. The lug shall be crimped in accordance with the lug manufacturer's recommendations. The lug shall be fixed to the raiser bracket using an M10 hot dipped galvanized bolt, flat washers and a nut, and the connection suitably protected against corrosion.

j) Equipment Access

The bracket shall be designed and installed in a manner to enable all equipment attached to the bracket to be worked on in a safe manner from a portable extension ladder.

k) Installation Instructions

Commercially available raiser brackets shall be supplied with the manufacturers recommended installation instructions.

l) Acceptance of Brackets

(i) Commercially Available Brackets

A bracket which is commercially available will be accepted only if a type test certificate showing that it complies with the requirements of this specification has been issued by a member of the National Association of Testing Authorities, Australia (NATA) and a copy of this certificate is in the possession of the Service and Installation Rules Management Committee.

A drawing of the bracket tested shall be endorsed by the Testing Authority and shall be attached to the test certificate. Full details of the material used and the construction of the bracket shall be shown on the drawing.

(ii) Brackets Not Available Commercially

The electrical contractor responsible for the electrical installation shall furnish proof, if requested to do so by the relevant Electricity Distributor, that a bracket meets the requirement of this specification.

5.5.2 Aerial Consumers Mains (including private Overhead Electric Lines)

In accordance with the Electricity Safety (Installations) Regulations, a private electric line to be constructed or to be substantially reconstructed must be placed underground except that overhead private electric lines may be constructed or substantially reconstructed in a low bushfire risk area. Application for exemptions from this requirement must be made by the customer to the Office of the Chief Electrical Inspector in accordance with the Electricity Safety (Installations) Regulations.

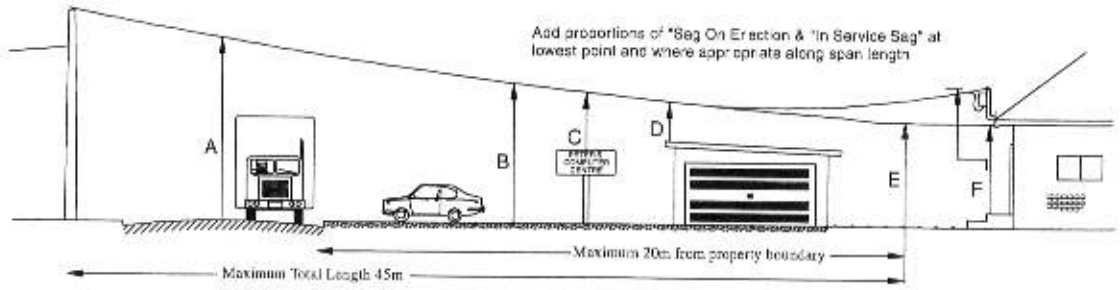
Private Overhead Electric Lines, where permitted, shall be installed and maintained to the requirements of the Electricity Safety (Installations) Regulations. In addition, acceptable guidelines are provided in Appendix B of these Rules.

Notes:

- Appendix C is a guide to assist the LEIW with polarity testing following repairs to Aerial Consumer's Mains or other circuits.
- Any pole marked with an "X" cut into or marked on the surface has a limited life and must therefore be considered unsafe to climb or support a ladder unless made safe.

NEW AND REPLACEMENT SERVICE CABLE CLEARANCES

The minimum clearances must be maintained under the worst operating conditions



	AREA	MINIMUM CLEARANCE
A.	Above a public roadway**:	
	• Over a 2000mm wide strip in the centre of each carriageway of a roadway and over any other part of a freeway, primary road or highway.	5500mm
	• Over any other part of a secondary road, or collector road.	4900mm*
	• Over any other part of any other road.	4600mm*
B.	Over driveways and ground traversable by vehicles, ie, customers property which a vehicle may enter or cross without impediment.	4600mm*
C.	Over any structure or part of building on which a person cannot stand, eg, sign, mast, blank wall, fence.	100mm
D.	Over those parts of a building or structure –	
	• not normally accessible to persons but on which a person can stand, eg, car-port, pergola, veranda.	100mm
	• normally accessible to persons, eg, balcony.	2700mm
E.	Elsewhere eg. over areas of a customers property which are not traversable by vehicles.	3000mm
F.	At the Point of Attachment.	3100mm

NOTES

Where a Distributor has an Electricity Safety Management Scheme or Regulation Exemption in place the clearances may vary from those shown.

Refer to the relevant Distributor for further details.

A conductor drip loop of up to 250mm is permissible below the POA.

* **These clearances are increased to 5200mm 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, Bulcke, and Yarriambiak.

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

Service cables will sag after erection due to temperature rise and construction loadings. Proportions of the "Sag On Erection" plus the 'In-service Sag Allowance" must be allowed for to ensure minimum clearances are met at all times. See Examples:

Cable Type	2, 3, 4 x 25mm & 4 x 35mm (≤ 80 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	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.

Examples

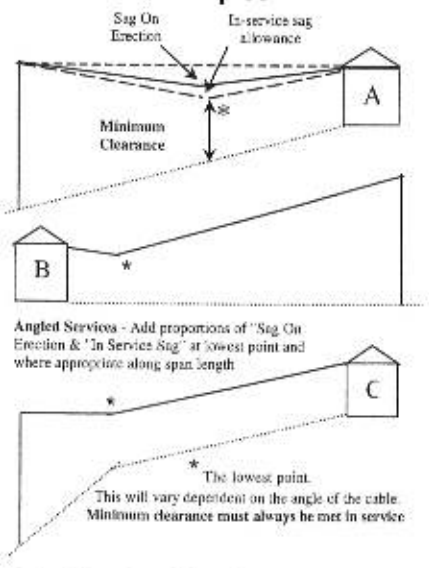


Figure 5.14(a) Guide to Insulated Service Cable Clearances for Terminating Span

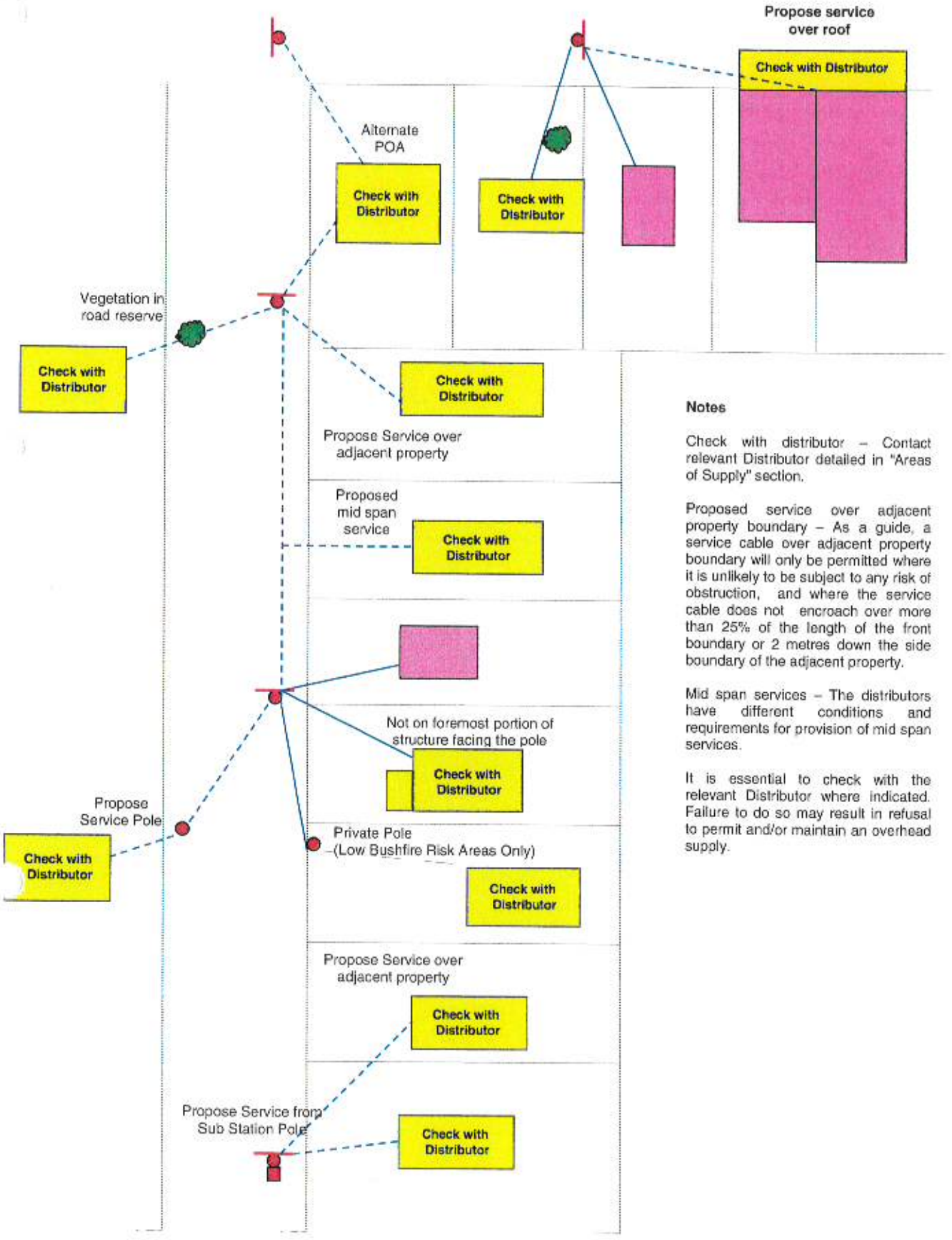


Figure 5.14 (b) Guide for Determining Service Cable Route (POA)

REQUIREMENTS:

1 Refer to the relevant Distributor for further details.

2 The POA shall not be located in dotted area.

3 The maximum POA height should not exceed 6 metres and shall permit work to be performed conveniently with access provided by ladder.

4 Access to "stick - operated" service fuse/s shall be available to allow ready operation from ground level with a fuse operating stick.

5 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 3.0m above the surface normally accessible for pedestrian traffic or resort.

6 For opening windows & doorways:-

(a) Top of window/door less than 2.7m above floor level:-
POA shall not be within an area 0.9m from bottom and sides of window/door and extending to 3.0m above floor level.

(b) Top of window/door greater than 2.7m above floor level:-
Under 3.0m from floor level, POA shall not be within 0.9m from sides and bottom of window/door.
Above 3.0m from floor level, POA shall not be within 0.3m from sides and top of window/door.

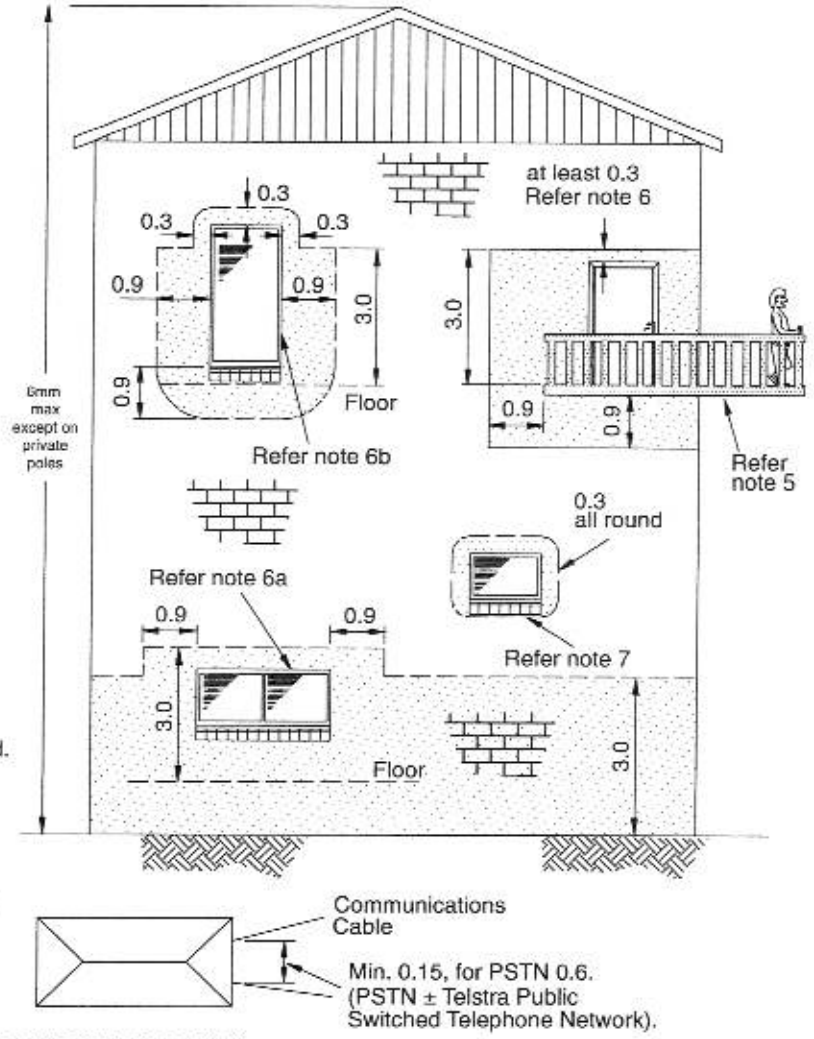
7 For non-opening windows, POA shall not be within 0.3m from the window.

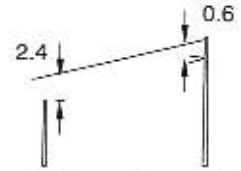
8 Unless a more appropriate location is available, the POA shall be located on the foremost portion of the structure facing the pole or point where the aerial service cable originates.

9 If any of the above requirements cannot be met the consumer's mains shall be installed underground. The REC must negotiate servicing arrangements with the Distributor.

10 The POA where practical, should be located to avoid the crossing of adjacent properties, roofs and verandahs, etc. Where this cannot be readily achieved, the Responsible Officer must be consulted as an underground supply may be required.

11 All dimensions in metres.





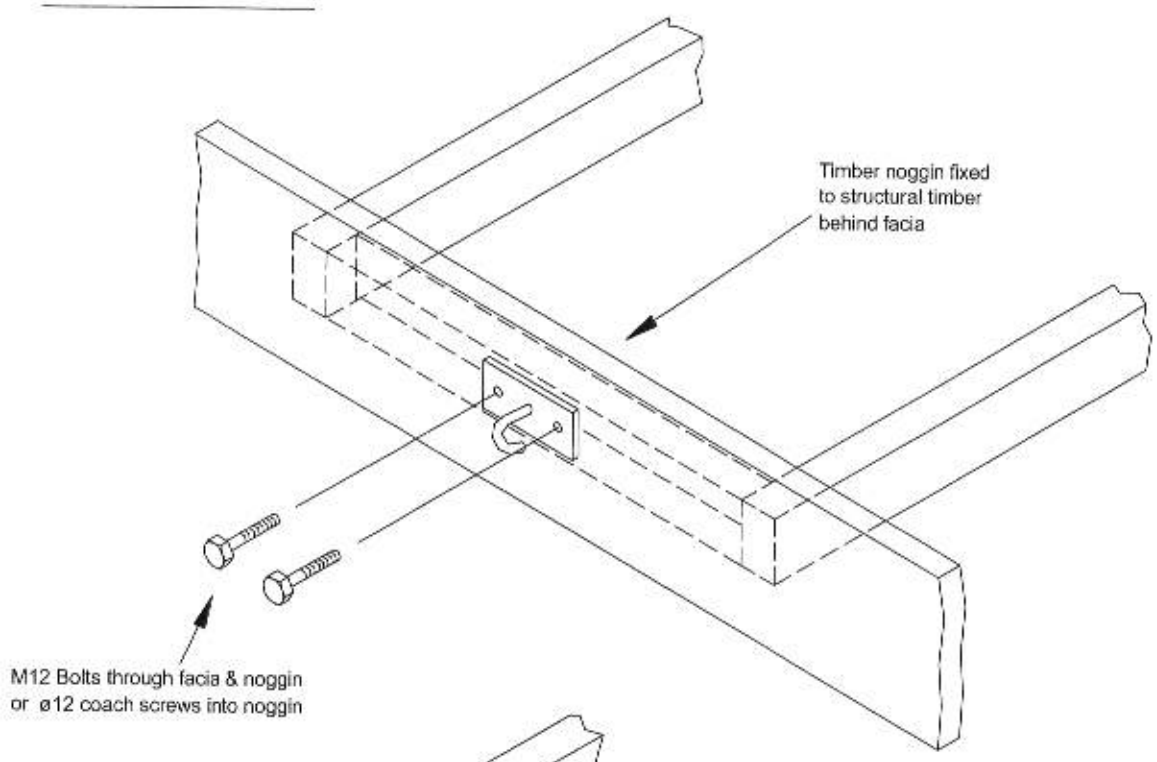
Over street traction wires and conductors or approach to communications poles where unattached.

At the point of attachment or at any point along the length of service

CLEARANCES FROM COMMUNICATIONS CABLES OR STREET TRACTION CONSTRUCTION
(Refer to Code of Engineering Practice for Shared Use of Poles).

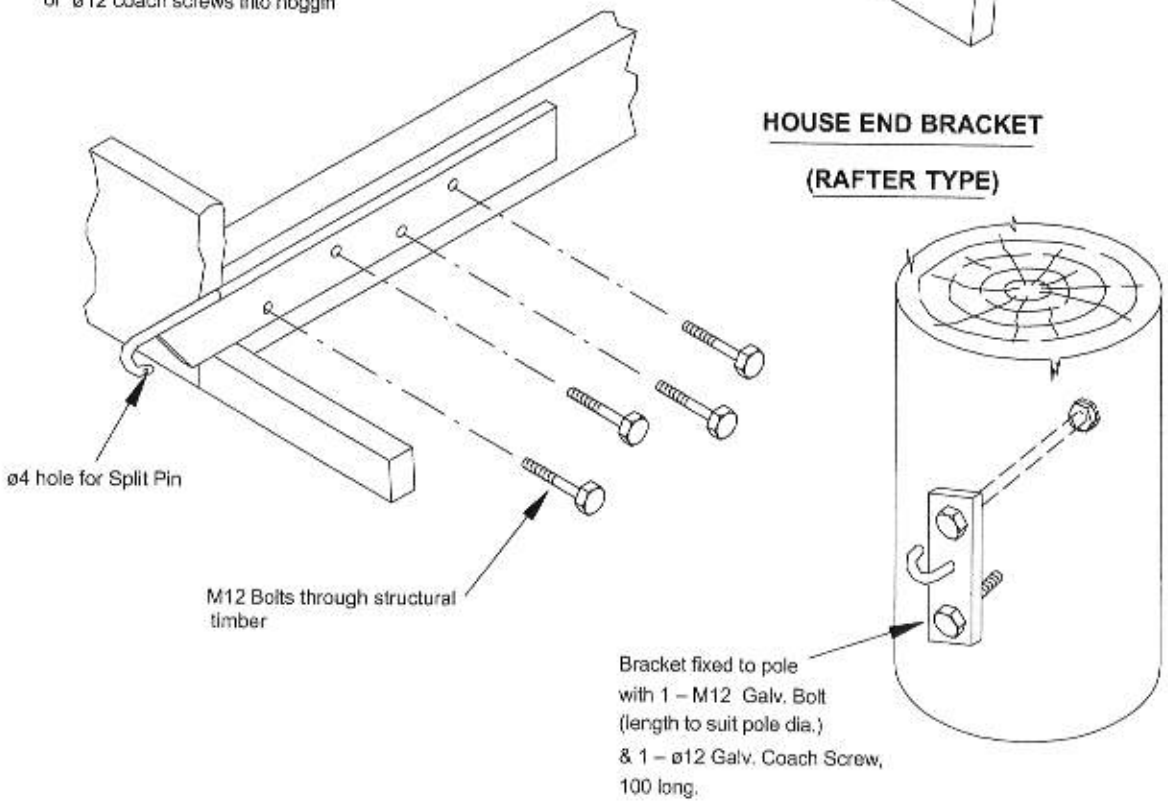
Figure 5.15 Requirements for Location of Point of Attachment (POA)

HOUSE END BRACKET



HOUSE END BRACKET

(RAFTER TYPE)

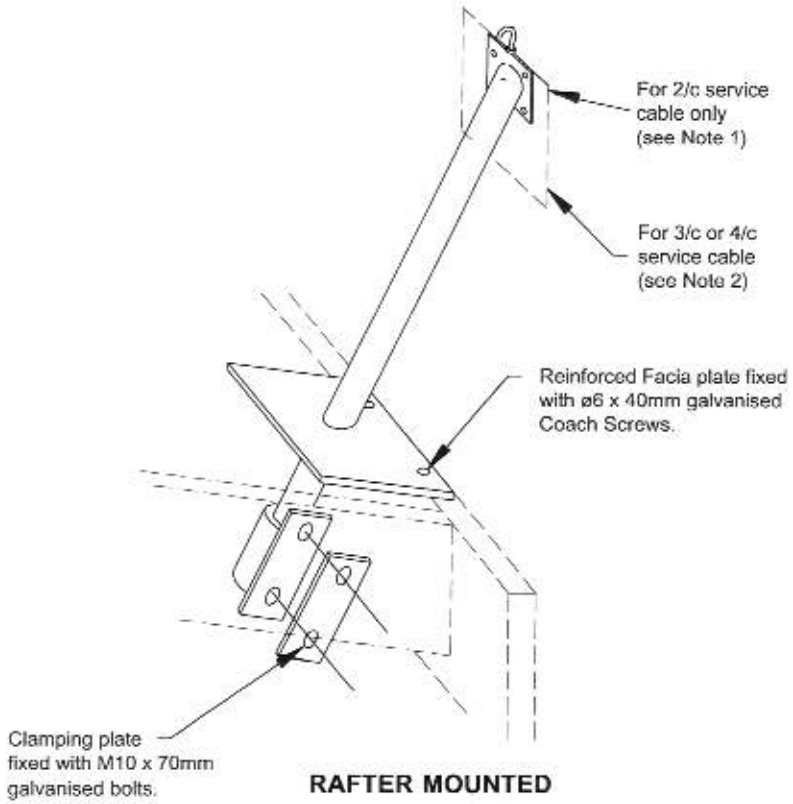


NOTES:–

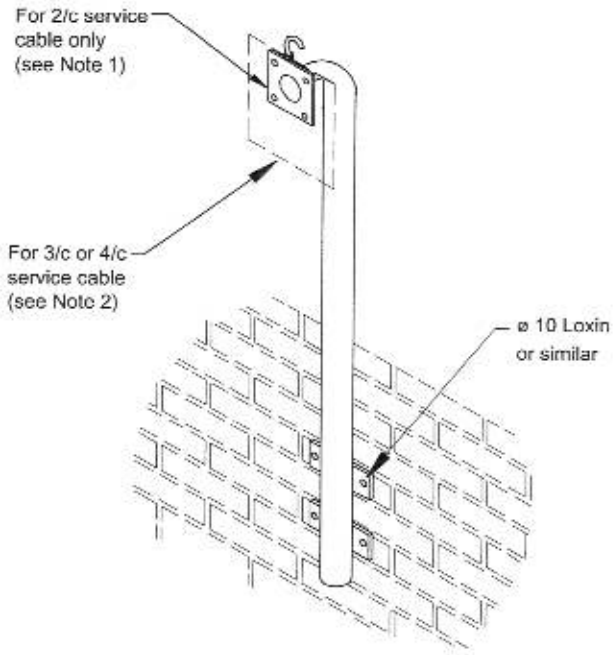
1. Hook down for uplift in service cable.
2. Hook up for service falling away from POA.
3. All bolts and screws to be galvanised.

POLE END BRACKET

Figure 5.16 Service Bracket – Typical Installations



RAFTER MOUNTED



SURFACE MOUNTED

NOTES

1. 2/c Raiser Brackets :–
   - Have a small FOLCB mounted mounting plate (75x100mm approx) with "1kN" stamped on the back.
   - Only suitable for 2/c service cable.

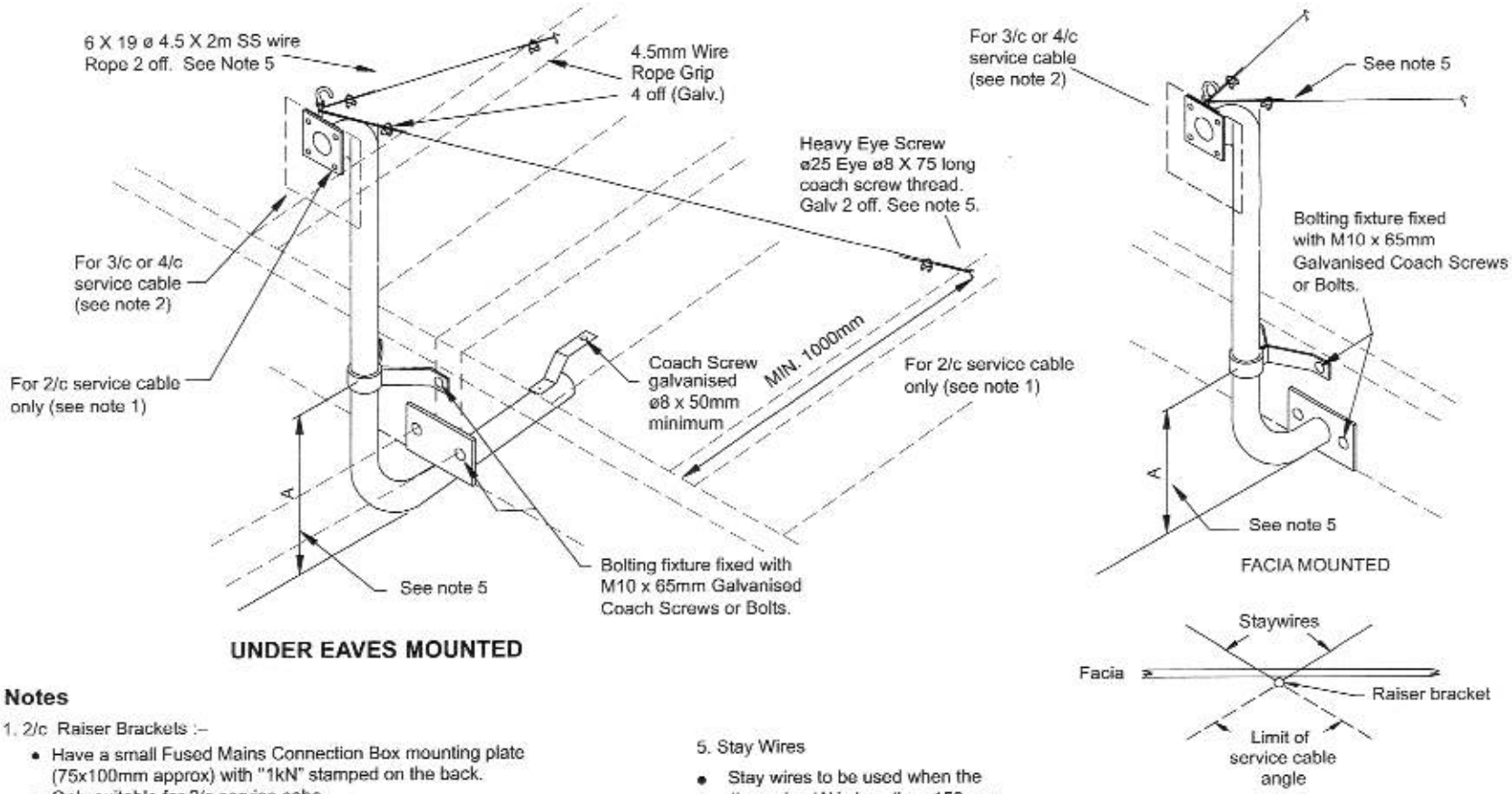
2. 3 or 4/c Raiser Brackets :–
   - Have a large FOLCB mounting plate (230x230mm approx) with "2kN" stamped on the back.
   - Suitable for 3 or 4/c service cable

3. Only approved raiser brackets shall be used.

4. The customer is responsible for the installation of raiser brackets.

5. 2/c denotes 2 Conductor, 3/c denotes 3 Conductor, etc.

Figure 5.17 Typical Service Raiser Brackets



Notes

1. 2/c Raiser Brackets :–
   - Have a small Fused Mains Connection Box mounting plate (75x100mm approx) with "1kN" stamped on the back.
   - Only suitable for 2/c service cabe.
2. 3 or 4/c Raiser Brackets :–
   - Have a large FOLCB mounting plate (230x230mm approx) with "2kN" stamped on the back.
   - Suitable for 3 or 4/c service cable
3. Only approved raiser brackets shall be used.
4. The customer is responsible for the installation of raiser brackets.
6. 2/c denotes 2 conductor, 3/c denotes 3 conductor, etc.

5. Stay Wires
   - Stay wires to be used when the dimension 'A' is less than 150 mm.
   - Service cable angle limit with staywires fitted is shown.
   - Eye Screw to be fitted through a ø10 hole drilled through the roofing material. Once positioned the remaining gap around the eye screw is to be sealed with a suitable sealant.
   - Stay wires to be installed at angles that provide support against the pull of the aerial service cable.
   - Additional structural support or noggins (not shown) may be required to prevent twisting of rafters or joists.

Figure 5.18 Typical Service Raiser Brackets

Metering

6

Section 6 Contents

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6.1 Introductory

6.1.1 General

The customer shall provide and maintain adequate mounting and installation facilities for the Electricity Supplier metering equipment in the position/s approved or selected by the Responsible Officer. Equipment supplied and installed by the Electricity Supplier shall, unless otherwise agreed in writing, remain the property of the Electricity Supplier.

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.

The Electricity Supplier may, however, arrange for the supply and installation of a meter panel for mounting of the metering equipment under exceptional circumstances or as a replacement of an existing panel in an existing installation as determined by the Responsible Officer.

However, in either case, equipment installed on the meter panel which is directly associated with Electricity Supplier metering of the supply shall be considered as metering equipment for the purpose of the Electricity Safety (Installations) Regulations.

Unless otherwise agreed in writing, equipment other than that required for Electricity Supplier purposes, or as detailed in these Rules for Builders Supply Poles, shall not be installed on the meter panel.

For information regarding High Voltage Metering refer to Clause 8.6.

6.1.2 Alterations and Additions to Existing Installations

In general, where metering installations are changed or relocated, standard metering arrangements as required by this Section shall apply.

Where additional metering and control devices, including fuses and links, can be accommodated on an existing timber meter board or panel, the Responsible Officer will arrange the fixing of such equipment to the board or panel and connection to suitable wiring provided by the customer.

Note: The reuse of an existing meter board or panel is subject to the following conditions:

- A minimum wiring space of 50 mm exists at the rear of the meter panel or board; and
- The panel or board is installed on a wall or in an enclosure consisting of, or lined with, fire resistant material, and
- A visual examination of the panel or board as installed does not indicate damage (eg. split, water or fire damage).

For meter panels other than timber, the customer shall be responsible for the replacement and installation of any additional fuses and links as required.

Where an existing meter panel in a domestic installation must be replaced, and the installation of a standard meter panel would require significant structural alterations, the size of the replacement panel may be less than 400 mm wide x 380 mm high provided the new panel will accommodate all the necessary equipment.

Warning: Care must be taken to allow for the panel opening requirements with all metering equipment installed. See Clause 6.5.1.

Notes:

- See Clause 3.2 regarding Charges Applicable
- Refer also to Clause 1.7.

6.2 Location And Accessibility of Metering Equipment

6.2.1 General

Meters shall be located in a position readily accessible for fixing, reading, testing, adjustment and removal, without difficulty or hazard. The position should be such that access can be gained without having to obtain a key.

However, objection will not be raised to positions within business premises which will normally be open between the hours of 9.00 am and 5.00 p.m. Monday to Friday. Refer Clause 6.2.3 or 6.2.4 for details.

Adequate level working space, not less than 1.2 metre wide – or the width of a group of meter panels, whichever is the greater – by 1.0 metre deep shall be provided and maintained in front of each metering panel and shall extend to a height of 2.0 metres above the floor, platform or level ground. This space is required to enable authorised personnel to read meters, place and use test equipment and work safely. Any opening providing access to this space shall be not less than 2.0 metres in height and 0.6 metres in width.

Mounting height of meter panels shall be in accordance with Clause 6.6.1 for Direct Metering and Clause 6.7.2 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. In addition, a gas regulator shall be not less than 500 mm radially from any electrical metering equipment. Refer to Figure 6.2 and AS2430.

Any elevated floor or platform used to provide access shall be fitted with a railing unless otherwise approved by the Responsible Officer and shall be both substantial and permanent. Access to such elevated positions shall be provided by an approved fixed stairway or ramp equipped with a handrail. Access by means of a ladder is not acceptable.

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 for meter reading. Access thereto shall be kept clear, clean and free of rubbish. The room shall not be used for any other purpose such as storage of furniture, cleaning materials or equipment.

Locking of access to metering equipment, including a meter box or other enclosure, is only acceptable by means of a "Power Industry Lock" and by arrangement with the Electricity Supplier (See Clause 6.4.4). Such locks shall be used only on doors or gates which provide access to the property and/or to an enclosure or room housing Electricity Supplier equipment.

For installations on properties exceeding 0.4 Ha in area the Responsible Officer shall be consulted regarding a suitable meter location.

6.2.1.1 Unsuitable Metering Locations

Electricity Supplier metering equipment shall not be erected 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 6.4.4).

In addition, the following locations are not acceptable for metering equipment:–

- Areas to which access is normally restricted – for security, health or other reasons. (This would include areas in which animals may be kept for security reasons).
- 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 2.0m above finished ground level at the point at which access is obtained. (Refer Fig. 6.1).
- On a single occupancy building, greater than 2.0m below finished ground level at the point at which access to the structure is obtained.

- Above a gas meter, except where shown in Figure 6.2.
- 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, dust, noise, vibration or other external factors of such nature as may cause deterioration of equipment or unsatisfactory working conditions.
- Hazardous areas as defined in the Wiring Rules.
- Where the ambient temperature is maintained in excess of 30°C.
- Where there is insufficient light.
- In fire isolated stairways, passageways or corridors.
- Where access is restricted by vegetation.

6.2.2 Single Domestic Premises

In single domestic premises, the metering equipment shall normally be fixed in a position which is readily accessible without having to enter rooms, enclosed verandahs or yards which may be locked. Suitable locations are shown in Figure 6.3.

Therefore, in general, the meters on a residence 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.

Where the main entrance is on the side of the residence the metering may be installed on that side not further than 1.5m beyond the main entrance subject to access being available.

In addition, the meters shall, except as provided in Clause 6.4.4, be located outside any fence or any area to which access is capable of being restricted by simply fitting a door or gate.

Where a perimeter fence which restricts access is erected between the building and the access street, the metering equipment shall be 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. Alternatively, and subject to the approval of the Responsible Officer, where an access door or gate is fitted, a "Power Industry Lock" shall be installed (refer to Clause 6.4.4). This lock shall be accessible from outside the door or gate.

As a further alternative and subject to availability and agreement between the customer and the Electricity Supplier, an alternative metering system may be installed by the Electricity Supplier. Additional costs may be incurred in adopting this option.

As metering equipment may produce a degree of noise, installation on a bedroom wall is not recommended – but is acceptable.

6.2.3 Single Business Premises

Unless otherwise approved by the Responsible Officer, in single business premises, metering equipment shall be fixed in a position as close as practicable to the entrance to the premises and which is readily accessible without having to enter rooms or areas not normally open to visitors or the public.

In addition, metering equipment shall not be located in areas intended for product display such as shop windows or where access is restricted during normal operations for security, health or other reasons.

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 as detailed in Clause 6.2.4.

6.2.4 Multiple Occupancy Premises

These requirements apply equally to domestic and non–domestic installations.

WARNING: Whenever a property or building is of a type which may be subdivided, care should be taken to ensure that the meters and wiring are located within the area which would be set aside as common property or within the individual lot supplied thereby. Wiring installed within an individual lot must be associated only with that lot.

Where a property is subdivided the foregoing is mandatory.

Where an installation consists of a number of separately metered occupancies, the metering equipment shall, except as provided below, be grouped at the main switchboard for the installation, located to comply with Clause 6.2.1 and in a position such that all occupants have common right of access thereto.

The metering may, alternatively, 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 6.2.1.

The door/s of rooms and enclosures for housing metering equipment shall be labelled "Electricity Meters".

Notwithstanding the above, in exceptional circumstances the Responsible Officer may approve metering at individual locations on separate structures. Conditions of such approval should include written assurance of ongoing unrestricted access (in accordance with Clause 6.2.1) to each meter location.

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.

Note: Attention is directed to Section 7 of these Rules regarding additional requirements for multiple occupancy premises.

6.2.5 Public Thoroughfares

Where metering equipment is required to be installed on Crown land (or road reserves), the customer shall supply a suitable enclosure and mounting facilities for this equipment within or on the customer's installation and, except as provided below, remote from the Distributor pole (minimum 2.0 metres). The metering equipment shall be installed in a location readily accessible to Electricity Supplier personnel for reading, replacement or maintenance. Suitable locking arrangements using a "Power Industry Lock" shall be fitted to prevent unauthorised interference (refer to Clauses 6.4.3 and 6.4.4).

In special circumstances, and by negotiation, supply may be provided to an enclosure on a Distributor pole. In such cases the use of the pole will comply with the "Code of Engineering Practice for Shared Use of Poles" as appropriate . The customer is responsible for the supply and mounting of a suitable enclosure in a position nominated by the Responsible Officer, generally on the "footpath" side of the pole. The minimum mounting height shall be 2.7m to the bottom of the enclosure. The top of the enclosure should generally not exceed 3.5m above ground level.

The customer shall provide any service protection device required and all necessary materials for connection to the Distributor's supply mains.

Drilling of concrete poles is NOT PERMITTED under any circumstances as ingress of moisture can lead to failure of the pole; hence fixing of apparatus shall be effected by suitable brackets and/or stainless steel bands. In the case of a concrete pole carrying high voltage conductors, the Responsible Officer may require additional insulation between consumers' mains or apparatus and the body of the pole or brackets attached thereto.

Notes:

- A minimum safe working distance of 2.0 m from any exposed live apparatus shall be maintained by all persons and any material in direct personal contact therewith.

If this clearance cannot be maintained, the Distributor **MUST** be consulted before proceeding.

- The Electricity Safety Act 1998 prohibits the installation of electric cables on public land by or on behalf of persons or bodies other than those permitted by the Act.
- Electrical wiring, installed in a public thoroughfare – including that for any public or other lighting scheme – which is to be maintained by a customer, is an electrical installation and hence shall comply with the Electricity Safety (Installations) Regulations.
- Reference shall be made to the Responsible Officer for installations attached to Tramway Poles.

6.3 Unmetered Equipment

To prevent diversion or interference to the supply, the customer shall make provision for the Electricity Supplier to affix seals to prevent unauthorised access to terminals of all unmetered equipment. In general, seals will be of wire and seal type approved for the use or alternatively by an approved Electricity Supplier locking device.

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

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

Where isolating switches are enclosed and access is capable of being restricted by a lock, the locking off facilities are deemed to be satisfied.

6.4 Protection of Electricity Supplier Metering Equipment (Including Current Transformers)

6.4.1 General

Any enclosure used to house metering equipment shall be constructed in a manner to prevent the spread of fire in accordance with the requirements of the Wiring Rules for construction of switchboard cases and surrounds.

A suitable mechanical protective barrier shall be supplied and installed by the customer where the metering equipment is located within a storage area or in a position capable of being struck by vehicles. The barrier shall allow for the minimum working space required by Clause 6.2.1.

6.4.2 Within or on Normally Occupied Premises

The customer shall provide adequate protection for the metering equipment where, in the opinion of the Responsible Officer, the equipment would otherwise be exposed to mechanical damage, effects of the weather, sea air, corrosion, etc.

Where such protection is required it shall take the form of a weatherproof box providing a minimum degree of protection IP23 to AS1939, with hinged door or lid fitted with a suitable catch. This box shall be constructed of galvanised steel or other approved materials and shall be such that the metering equipment is completely enclosed yet remains accessible.

Where locking of the box is considered desirable, the customer may arrange the fitting of a "Power Industry Lock". (Refer to Clause 6.4.4).

6.4.3 Installed Externally in Isolated and Unattended Locations

Where Electricity Supplier meters are installed in boxes externally on buildings or poles in isolated and unattended locations, the boxes shall be constructed using galvanised steel or

equivalent material of sufficient strength to afford protection against vandalism, weather or other external factors and shall have an IP rating suitable for the environment. Such boxes must be kept locked at all times, using the "Power Industry Lock", or otherwise be installed to the satisfaction of the Responsible Officer.

6.4.4 Locking of Metering Equipment Enclosures

Where locking of enclosures, gates or doors which provide access to metering equipment other than Current Transformers is considered necessary, the customer shall arrange for the lock/s involved to be keyed to the "Power Industry Lock".

"Power Industry Lock" cylinders and padlocks which are keyed to the Victorian Power Industry master key system are available through retail hardware merchants throughout Victoria. Refer to Clause 1.10.

6.5 Meter Installation

6.5.1 General

Unless otherwise agreed in writing, metering and control equipment considered necessary by the Electricity Supplier to record and control electricity consumption shall be supplied and maintained by the Electricity Supplier, and shall remain the property of the Electricity Supplier.

The customer shall provide facilities including a meter panel which complies with AS 1795 Part 1 as a Type X or Type Z material and, where required, plug–in meter sockets, together with any surrounds or enclosures, securely fixed to a wall or rigid supporting structure, for the mounting and connection of the Electricity Supplier's metering equipment.

For details and requirements of suitable meter panels, metering enclosures, surrounds, links and fuses, a specification is available from the local Distributor.

A commercially manufactured frame or enclosure is an acceptable alternative to any of the arrangements described herein provided that type acceptance has been obtained **following the submission of designs to the Convenor, Service and Installation Rules Working Group" (refer to Foreword for mailing address). Refer to AS6002 for domestic electricity metering enclosures.**

The fastening of a metering panel to an enclosure or frame shall be effected by means of hinges attached to the vertical edge of the panel and shall allow for the panel to be readily opened to an angle of not less than 80 degrees from the closed position with all metering equipment installed. (This may require a double hinged section). Refer to Figures 6.4 and 6.5 for details. Care must be taken when erecting multiple panels adjacent to each other to allow the panels to be opened, without obstruction, after the metering equipment has been installed.

Every hinged panel shall be installed in accordance with the requirements of the Wiring Rules for hinged switchboard panels and in addition with the requirements of these rules. Such panels shall be capable of being sealed in the closed position with an Electricity Supplier seal.

Where the determined maximum demand of any separately metered portion of an installation exceeds 100 Amperes per active conductor, the Responsible Officer may require that the meter be of a type operated by current transformers. In such cases the customer shall provide a hinged metering panel together with adequate space, housing and wiring facilities for the Electricity Supplier's current transformers and metering equipment. The Electricity Supplier will normally arrange for the provision and installation of the wiring for the meter panel for such installations. Refer to Clause 6.7 for details.

6.5.2 Common Enclosure Housing Metering and Switchboard Equipment

Where a common enclosure is to accommodate equipment other than Electricity Supplier Current Transformer and/or metering equipment, adequate space shall be provided to

accommodate such equipment independently of the Electricity Supplier equipment. Dimensions quoted in these Rules do not allow for any other equipment.

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 such that it does not obstruct the meter wiring space. Similarly, wiring not associated with metering shall not be installed within a Current Transformer enclosure.

In general, wiring behind the meter panel/s and switchboard wiring should be physically separated from each other with suitable provision for the passage of the necessary conductors between the two sections. The only exception is a builders supply meter box and switchboard mounted on a builders supply pole.

6.5.3 Switching Service

In some circumstances a switching service may be available to control customers (off peak) loads. For details please contact the Electricity Supplier. Refer also to Clause 3.3.2 and Figure 3.1.

6.6 LV Installations up to 100 A Per Active Conductor

DIRECT CONNECTED METERING

6.6.1 General

Direct metered installations shall be so arranged that any meter panel is installed at a height above the floor or ground not more than 2.0m to the top edge. The lower edge of the panel, above the floor or ground, shall be not less than 1.0m in the case of a single occupancy and 0.6m in the case of multiple occupancies, unless the Responsible Officer approves of a lesser height in a particular instance.

Note: Refer to Clause 6.4 regarding protection of metering equipment.

Where the panel is enclosed, a **minimum** clearance of 5 mm shall be provided from the front face of the metering equipment to the inner face of the door or any internal projection thereof.

Note: Direct metering equipment may be up to 175 mm deep.

The customer shall arrange for the supply, installation and wiring of the meter panel. Both the metered and unmetered consumers' conductors shall be installed, prepared and connected, as necessary, ready for the installation of the Electricity Supplier's metering equipment.

The customer shall also arrange for the supply, installation and wiring of service protective devices and metering neutral links as specified in Figures 6.6 to 6.30 and which must be capable of accepting Electricity Supplier seals.

Service protective devices shall be 100 Amp, 500 Volt hand operated fuse carriers and bases, backwired to accommodate Size 2A Fuse Links to AS2005 (57 mm x ∅ 22.2 mm).

The metering neutral link shall have a rating of 100 Amp, 500 Volt with a removable insulating cover. Unless otherwise approved by the Responsible Officer, neutral links shall be mounted on the face of the meter panel as shown in figures 6.6 to 6.30.

Neutral links for multiple metering installations may be mounted behind the meter panel where access to the incoming neutral is readily available and the metering neutral conductors are arranged to the satisfaction of the Responsible Officer.

Where plug–in meter sockets are required, the customer shall arrange for their supply, installation and wiring ready for the insertion of a meter. Refer to Clause 6.6.2.2.

The 'standard' meter panel arrangements will accommodate either Plug–in meter sockets or bottom connected meters. There is a variation in the numbers of each type accommodated on certain panel sizes for multiple installations (Refer to Clauses 6.6.2.1 and 6.6.4).

Meter wiring to be terminated on the meter panel shall be permanently labelled to indicate the function of the conductor. Refer to Clause 4.8.2, Clause 5.4.3.8(a) & (b) and Figures 6.6 to 6.30. For example: (line/load, hot water, light/power, etc).

In addition, for multiple installations, meter panels shall be clearly and permanently labelled to indicate occupancy identification, in accordance with Clause 7.1.3, for all equipment to be mounted on the panel.

6.6.2. Metering Equipment Wiring

In general, wiring of meter panels shall be arranged to conform with the tariffs selected by the customer. Typical arrangements are shown in Figures 6.6 to 6.30 and Appendix F.

The customer shall provide sufficient length of cable attached to the metering panel and brought through suitable holes in the correct positions ready for connection to the metering equipment. A cable length of between 100 mm and 150 mm shall protrude through the meter panel with 20 mm of insulation removed from the cable ends. (Refer to Figures 6.6 to 6.30)

Conductors shall be multi – stranded soft drawn copper of a size to suit the maximum demand of that portion of the installation being metered and in any case having a cross sectional area of not less than 4mm^2 or not greater than 35 mm^2. Metering conductors which do not form part of the consumers' mains (ie do not carry load current) shall be stranded conductors not less than 2.5 mm^2 and not more than 6 mm^2. This includes time switch and meter changeover circuits which do not carry load current.

Neutral conductors for each meter and time switch shall be coloured black and originate from a terminal of a neutral link. Looping between terminals of apparatus is **NOT ACCEPTABLE** however active conductors may be looped at line terminals of apparatus. The incoming neutral conductor to a neutral link shall be clearly identified.

Where solid, aluminium or hard drawn copper conductors are employed for the customers circuit/s, such conductors shall be converted to multi strand annealed copper conductors of equivalent current carrying capacity for connection to the meter terminals. 25 mm^2 and 35 mm^2 conductors shall have not less than 18 strands. Any other form of conductor is **NOT ACCEPTABLE** for connection to metering equipment without specific approval of the Responsible Officer.

The wiring of each metering panel shall conform with that shown in the wiring diagram for the relevant installation type or shall otherwise be installed to the satisfaction of the Responsible Officer. All meter panel wiring shall be neatly loomed vertically up the hinged side of the panel and horizontally to the appropriate conductor terminations to allow the panel to be readily opened with all apparatus installed. The loom shall be secured to the meter panel.

Details of off peak load control arrangements should be obtained from the Electricity Supplier.

In accordance with Clause 3.3, the Electricity Supplier may provide switching for the customers qualifying off peak load up to a maximum of 30A, 240V single phase.

For loads exceeding 30A, 240V single phase, the Electricity Supplier may provide switching for the coil/s of suitable contactor/s or relay/s installed on the customer's switchboard which will be arranged to control ALL the off peak load. For the purposes of this clause, space heating and water heating shall be considered separately.

6.6.2.1 Isolation of Metering Equipment

Supply to each metering panel shall be capable of being individually isolated.

(a) Single meter panel installation.

For installations comprising not more than one meter panel isolation of metering equipment may be achieved as follows:–

- In general, by the operation or removal of a service protective device/s at a location remote from the meter panel.

  For example: Removal of fuses at a point of attachment or within a substation.

- For installations supplied by means of and underground cable, by the removal of fuses mounted on the meter panel.

(b) Multiple meter panel installation.

For direct metered installations comprising more than one meter panel a single switch operating in all active conductors shall be provided on the supply side of each meter panel.

(c) Multiple occupancy metering.

Each individual occupancy metering shall be capable of being individually isolated as required by Section 7 – Multiple Occupancies.

6.6.2.2 Plug–in Meters

Not all Electricity Suppliers use plug–in meters, hence any request for their use should be directed to the Responsible Officer of the Electricity Supplier at an early date to avoid delays and determine additional charges, if any, which may apply. Refer to Clauses 6.6.3 and 6.6.4.

Where plug–in meters are used, the supply and installation of the associated sockets is the customer's responsibility.

6.6.3 Single Installation Metering

For single installation metering the customer shall arrange for the provision and installation of a fully wired metering panel and, where exposed to the weather, an enclosure, suitable for the supply and installation of the metering equipment.

Where plug–in meters are to be installed for single phase metering the customer shall arrange for the provision, installation and wiring of the necessary sockets ready for the insertion of the meter.

Unless otherwise approved by the Responsible Officer the size of the metering panel shall be not less than 400 mm wide x 380 mm high and arranged as specified by Tables 6.1 and 6.2 or 6.3 as appropriate (Refer to relevant wiring and layout diagrams at the end of this Section).

Where exposed to the weather, the metering panel shall be mounted:–

- in a standard commercially manufactured meter box which is marked to indicate that it has been submitted and accepted in accordance with Clause 6.5.1; or
- in a meter box constructed in accordance with the specification available from the Distributor. Refer to Figure 6.4.

Where suitably protected from the weather, the metering panel shall be mounted:–

- as described above; or
- hinged and mounted on a suitable surround having the required clear space between the rear of the panel and the surface on which the surround is mounted as for a hinged switchboard panel in accordance with the Wiring Rules and Figure 6.5.

6.6.4 Multiple Occupancy Metering

Where a number of meters for different occupancies are to be installed at the one location (eg. adjacent to the main or a distribution switchboard), the customer shall arrange for the provision and installation of a fully wired meter panel or panels and, where exposed to the weather, an enclosure, suitable for the supply and installation of the metering equipment.

Where plug–in meters are to be installed for single phase metering, the customer shall provide, install and wire the necessary sockets ready for the insertion of meters.

Each plug–in meter socket shall be provided with a separate disconnection device eg. fuse link or switch. Where switches are used they shall be arranged so that they are accessible to Electricity Supplier personnel only. The switches shall be located in a separate compartment which shall be capable of being locked with a padlock having a shackle of not less than 5.5 mm diameter unless otherwise approved by the Responsible Officer.

IMPORTANT NOTE
The following arrangements are based on customers conductors not exceeding 35 mm^2 in cross section (at the meter panel). In the event that larger conductors are to be employed, the Responsible Officer shall be consulted regarding metering space requirements.

The metering panel/s shall be not less than the sizes given in Tables 6.2 or 6.3 for the relevant size of conductors and the number and type of metering installations. For mixed arrangements the Responsible Officer **MUST** be consulted.

Where exposed to the weather, each metering panel shall be mounted:–

- in a standard commercially manufactured meter box which is marked to indicate that it has been submitted and accepted in accordance with Clause 6.5.1 for the purpose; or
- in a meter box constructed in accordance with the specification available from the Distributor.

Where suitably protected from the weather, the metering panel shall be mounted:–

- as described above; or
- hinged and mounted on a suitable surround having a clear space between the rear of the panel and the surface on which the surround is mounted as for a hinged switchboard panel in accordance with the Wiring Rules. Refer to Figure 6.5

Where a greater number of metering installations are required, this shall be achieved by grouping a suitable number of panels in a modular fashion.

Warnings:

- Care must be taken that the opening arrangements described in Clause 6.6.1 can be attained after all metering equipment is installed. This may require the use of cable ways or blank fillers between the vertical edges of adjoining panels.
- **Not all Electricity Supplier's use plug–in meters, hence any request for their use should be directed to the Responsible Officer of the Electricity Supplier at an early date to avoid delays and determine additional charges, if any, which may apply.**

Notes:

- Attention is directed to Clause 6.6.2 regarding wiring arrangements.
- Where larger conductors are required due to voltage drop, they shall be reduced to comply with the above prior to termination on the meter panel.

Table 6.1 Meter Panel Conductor Size Limitations

Metering Panel Dimensions (mm) Width x Height	Minimum Clear depth behind meter panel	Maximum size of attached conductors
All sizes	75 mm	16 mm^2; or Up to four only 25 mm^2
400 x 590, 600 x 600; or 600 x 900	150 mm	35 mm^2

Table 6.2 Maximum Number of Metering Installations per Panel – 16mm^2 # conductors

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
400 x 380	2	1	1	Not Suitable
400 x 590	4	2	2	1
590 x 400	3	2	1	1
600 x 600	6	3	3	Refer to Electricity Supplier
600 x 900	9	4	4	"

Up to four 25 mm^2 conductors may be attached. Refer Table 6.1

Table 6.3 Maximum Number of Metering Installations per Panel – up to 35mm^2 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
590 x 400	3	2	1	1
600 x 600	6	3	3	Refer to Electricity Supplier
600 x 900	9	4	4	"

Notes to Tables 6.1, 6.2 & 6.3:

- The 400 mm wide x 380 mm high panel will not accommodate a multi–phase 'WINNER' or a single phase installation with two off peak loads in domestic situations
- Where larger conductors are required due to voltage drop, they shall be reduced to a suitable size prior to termination on the meter panel.
- In general, where conductors greater than 16mm^2 are required due to maximum demand, the minimum panel size shall be 400 mm wide x 590 mm high. However, this requirement need not apply where no more than four 25 mm^2 conductors are attached to the meter panel.
- Where the calculated maximum demand exceeds 100A per active conductor, the Responsible Officer may require that the metering be of a type operated by current transformers. (Refer Clause 6.7)
- The metering arrangements described above are designed for conductor sizes of up to 35 mm^2 in cross section and a calculated maximum demand of 100A per active conductor.
- Where a maximum demand exceeds 80 amperes per phase, it is recommended that meter panel fuses be spaced not less than 20 mm apart to enable effective dissipation of the heat generated.
- Consideration should be given to possible future change from single phase to three phase meter/s when determining meter panel sizes.
- The values specified in Table 6.1 are not applicable where other means, such as the use of flexible cables, are incorporated to ensure adequate flexibility.

6.7 LV Installation in excess of 100 A per Active Conductor

L.V. CURRENT TRANSFORMER METERING

6.7.1 General

Where the determined maximum demand of any separately metered portion of an installation exceeds 100 Amperes per active conductor, the Responsible Officer may require that the meter be of a type operated by current transformers (CT's).

The customer shall provide adequate space, housing and wiring facilities for the Electricity Supplier's current transformers and metering equipment including the meter panel as detailed below and should give as much notice as practicable of the proposed installation loading details.

6.7.2 CT Meter Location

The metering equipment shall be located at a position approved by the Responsible Officer.

In general, metering equipment should be located within a maximum distance of 10m route length of wiring from the CT's as detailed in Clause 6.7.5.

Access to metering equipment shall be direct (ground floor) or by stairs or lift. Ladder access is not acceptable.

A clear, level, paved, illuminated space as specified in Clause 6.2.1 shall be provided in front of the metering position to allow access for meter reading and to accommodate test personnel and their equipment.

The lower edge of the meter panel shall be located between 1.0m and 1.2m above the floor or ground level.

Unless enclosed in an independent enclosure having no projections, open, live or bulky apparatus is not permitted below or in front of the meter panel. Any controls, push buttons etc. should be enclosed. The Electricity Supplier will not accept responsibility for inadvertent operation of any apparatus located below or in front of the meter panel which is not protected.

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.

Unless effectively shielded as described above, the following clearances shall be maintained between conductors and meter panel:–

RATING OF CONDUCTOR (Amps)	DISTANCE BETWEEN METER PANEL AND THE NEAREST CONDUCTOR (mm)	
500	200	Interpolate for intermediate values
1000	400	
2000	600	
3000	800	

6.7.3 Meter Space Requirements

Meter space for CT metering should be confirmed with the local Electricity Supplier before a commitment to proceed is made.

The 'standard' meter panel size is 900 mm H x 600 mm W for a single CT metering installation.

This size allows space for installing equipment for energy pulsing or remote reading apparatus. Refer to Fig. 6.36 for standard CT meter panel layout.

Where the meter panel is to be erected independent of the customer's switchboard on a surround direct to a wall where there are no obstructions, the Electricity Supplier may accept a meter panel size of 600 mm x 600 mm. The electricity supplier must be consulted for this arrangement. In such cases energy pulsing or remote reading apparatus may need to be mounted separately and adjacent to the meter panel when required.

Space required for Current Transformers is separate and distinct from meter panel space. Refer to Clause 6.7.4.3.

The meter panel shall be hinged utilising lift off hinges to enable the Electricity Supplier to remove and replace panels.

Where installed within an enclosure the hinging of the panel shall be so arranged that the panel may be fully opened clear of the enclosure with all metering equipment mounted thereon. Refer to Clause 6.5.1

The panel shall be so arranged that a wiring space of not less than 50 mm is maintained behind the panel and a clear space of not less than 240 mm is provided in front of the face of the panel to accommodate the metering equipment.

Any door fitted to a metering enclosure shall have lift–off hinges. The door shall be labelled "**Electricity Meters**".

6.7.4 Current Transformers

6.7.4.1 General

Metering current transformers shall be mounted in a suitable enclosure segregated from meters and switchboard equipment. The space requirements for metering current

transformers are separate and distinct from those for the meter panel as detailed in Clause 6.7.3.

Metering current transformers (CT's) for a single installation should, where practicable, be located on the supply side of the individual customer's main isolating switch and be so arranged as to allow isolation of supply to the CT's by means of a service protective device.

In the case of a multiple occupancy installation, CT's should be located where they can be removed or replaced without unnecessarily interrupting supply to other customers. However, where other occupancies are dependant on a CT metered occupancy for ancillary services such as public lighting, air conditioning and fire services and cannot be occupied without such services, the controlling body may elect to isolate all or portion of such occupancies through a common isolator. It should be noted that 6.6.2.1 requires each Direct Connected Metered Occupancy be capable of being independently isolated.

In general, current transformers are supplied by the Electricity Supplier. The sizes of metering current transformers used vary from Electricity Supplier to Electricity Supplier. 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

Note: ESAA means Electricity Supply Association of Australia Limited.

Typical dimensions are given in Fig. 6.34

6.7.4.2 CT Mounting Details

These details are to be read in conjunction with Fig. 6.34 and 6.35.

The customer shall provide the necessary primary conductors and install the CT's.

CT's shall be fixed with **P1 (polarity) side facing the incoming supply.** In most cases CT's will have a label attached – "This side to Incoming Supply".

Provision shall be made to enable the easy replacement of any CT.

Unless otherwise approved by the Responsible Officer the minimum mounting height from the floor or platform to the lowest C.T. shall be 500 mm.

For primary circuits rated at 200A or less, the conductor passing through the CT window shall be either busbar as described below or, alternatively the Responsible Officer may approve the passing of a cable through the CT window to a termination point in the CT chamber or immediately adjacent to the chamber. To facilitate a CT change, attention must be given to the diameter of the conductor termination relative to the CT window diameter.

The primary conductor threaded through the CT's shall not have a metal sheath, screen or armouring.

For primary circuits exceeding 200A per phase, 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, or provided that the cable termination is within the CT chamber a cable of up to 240 mm^2 may pass through the CT and attach to a bolted connection as shown in Fig. 6.35.

For circuits carrying up to 1200 A, the spacing between centres of busbars shall not be less than 125 mm, and above 1200 A, not less than 150 mm.

Two methods of mounting current transformers are acceptable. These are "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. Refer to Figure 6.34 for details.

Friction clamping of CT's to busbars is not acceptable.

The secondary terminals of the CT's shall face outwards, or in the case of overhead horizontal duct, they shall face downwards.

Attention must be paid to additional space requirements to terminate large conductors, provision for CT removal, access to CT secondary terminals for tap changing and sealing of terminal covers in a safe manner.

6.7.4.3 CT Enclosure Details

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. (Refer to Figure 6.34 for details).

This space does not include any allowance for cable terminations or entry of cables. The minimum space required for terminating Distributor service cables shall not be less than as shown in Fig. 6.35.

The CT compartment shall be closed with a hinged door or hinged panel which must have provision for sealing in accordance with Clause 6.3. Unless installed in an overhead duct, the door or panel shall normally be hinged on a vertical side. Hinging at the top is permitted if the door is capable of being lifted off or secured in the open position at 170 degrees.

A clearly visible durable label – **"Electricity Metering Transformers"** – shall be affixed to the door or panel allowing access to the CT's.

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 cubicle or duct shall not be less than 300 mm deep with ready access to the CT's at all times. The secondary terminals of the CT's shall be as close as reasonably practical to the face of the enclosure (door or panel) and in any case not more than 300 mm behind the closed door.

Outdoor CT cubicles shall be lockable with a padlock having a shackle of not less than 5.5 mm diameter unless otherwise approved by the Responsible Officer.

No M.E.N. connection or equipment other than that required for metering purposes shall be located within a CT enclosure.

6.7.5 CT Meter Voltage and Current Wiring

Refer to Figure 6.37 for typical wiring diagram for L.V. CT metering.

The customer shall provide three 32 A fuse units, HRC, 440 V, complete with 32 A staggered offset tag cartridge fuse links to AS 2005, suitable for the connection and protection of 2.5 mm^2 or 4.0 mm^2 stranded copper conductors forming the active metering voltage supply circuit. These fuse units shall be installed within the CT enclosure and be connected to the primary active conductors. Fuses should preferably be mounted in the top of the CT enclosure, in the left hand front corner, they may, however be bar mounted provided they face outward and are easily accessible from the opening of the enclosure, so arranged that they are withdrawn directly toward the operator.

Cables used to connect the fuse units to the primary conductors shall be minimum 32 Amps rated and be so arranged as to minimise the likelihood of a short circuit developing over the life of the installation. (eg. not in contact with busbar of opposite phase). Single insulated conductors are acceptable only if arranged in this manner, otherwise insulated and sheathed cables shall be used..

The customer shall also provide a terminal connected to the primary neutral conductor – suitable for connecting the 2.5 mm^2 or 4 mm^2 copper meter voltage neutral conductor –

within the CT enclosure. Where the primary neutral conductor does not pass through the CT enclosure, the neutral conductor connecting this terminal shall be teed off the primary neutral with the connection thereto being effected by means of soldering, brazing or equivalent. This conductor shall be suitably identified as "metering neutral".

Electricity Supplier metering conductors will not be connected directly to aluminium conductors. Where aluminium primary conductors are employed, the customer shall provide all necessary conversions to allow for connection of copper conductors.

Provision for wiring between CT's and meters shall be provided in the form of channels, holes or knockouts within a switchboard or conduit elsewhere. In general 32 mm diameter conduit openings are acceptable. 32 mm PVC conduit is a suitable enclosure for secondary circuit wiring. Where rigid conduit is used elbows are not acceptable; bends shall be used to negotiate corners and their number should be kept to a minimum. A draw wire should be provided where the length of the run or a number of bends may affect the ease of installing a seven core cable and the bends should not be glued to the conduit until the cable is installed. Alternatively, the Electricity Supplier may provide the cable for installation by the customer.

A maximum route length of 10m for 2.5 mm^2 copper secondary circuit conductors between CT's and meter/s is acceptable. 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 mm^2 are necessary the customer will be required to meet the costs involved and/or may be required to provide and install conductors, complete with appropriate identification, to the satisfaction of the Responsible Officer.

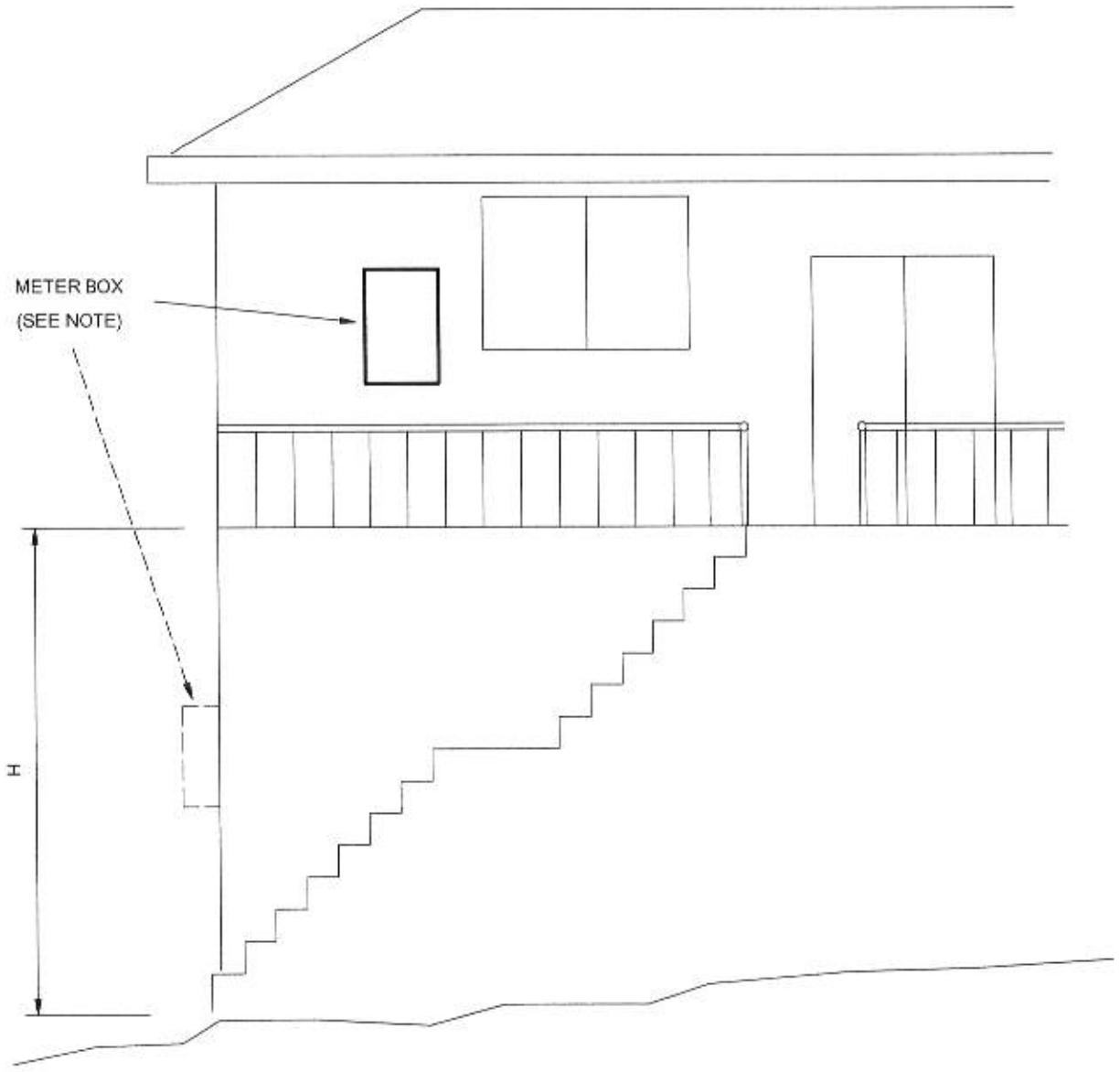
Earthing of metal metering enclosures shall conform with the requirements of AS3000, including size of earthing conductor. Where earthing of a separate metering enclosure is required, the earthing conductor may be installed within the conduit containing the CT secondary wiring. (Note: 2.5 mm^2 secondary wiring requires a 2.5 mm^2 earthing conductor – where no primary conductor is installed within the enclosure).

6.7.6 Supplies to Separate Circuits

Where supply to separately metered circuits is taken from within or adjacent to a CT enclosure, such circuits shall be controlled and protected in accordance with the Wiring Rules for either switchboard wiring or sub-mains as appropriate in the circumstances. (Whilst not recommended, looping from line side terminals to supply adjacent direct connected metering may be appropriate in certain cases).

6.8 Customer Owned Metering

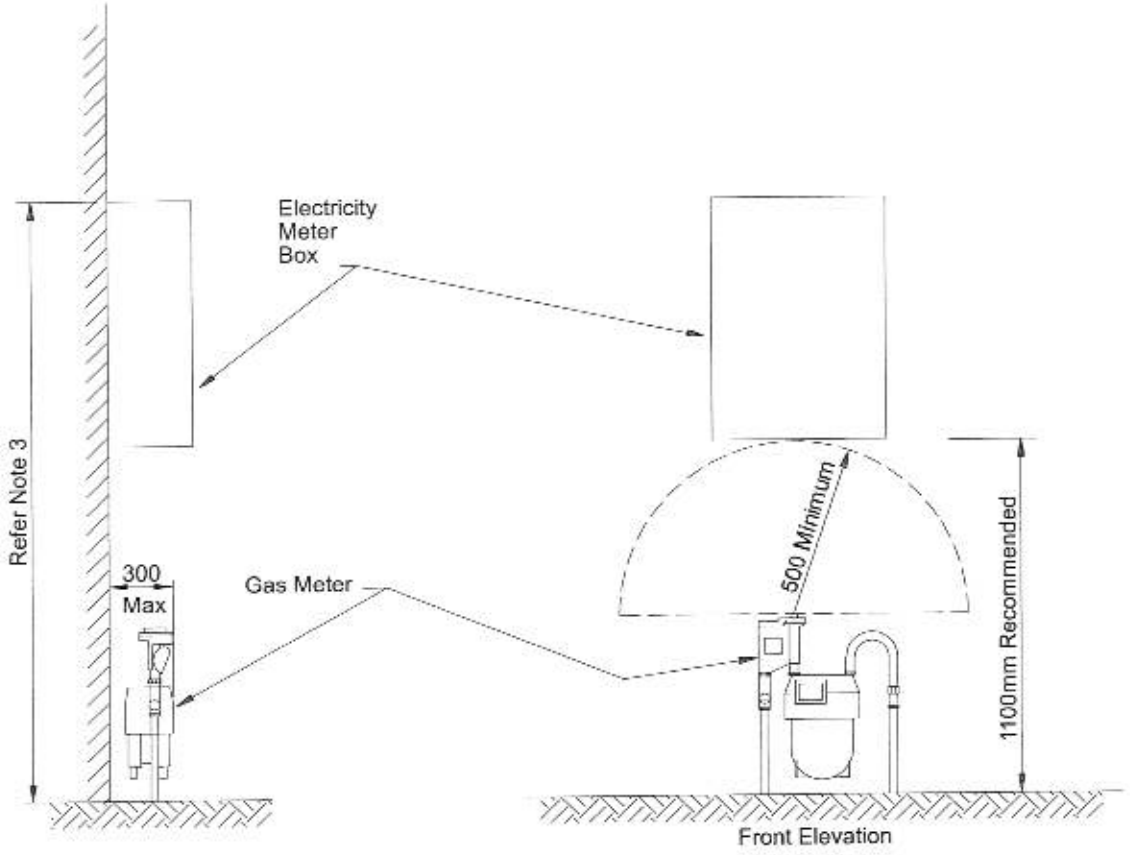
Meters installed by the customer for monitoring performance and energy usage shall not be located on the same panel as Electricity Supplier metering equipment unless specifically approved by the Electricity Supplier in a particular instance. All such meters installed in the same area as the Electricity Supplier metering shall be clearly and permanently marked **"CUSTOMER OWNED METERING"**



Notes

If dimension 'H' exceeds 2.0m, metering equipment shall be installed on lower portion of structure.

Figure 6.1 Acceptable Meter Locations for Elevated Premises



Notes:

1. The minimum clearance between any part of the electrical equipment and the gas meter regulator shall be 500mm.
2. Refer to AS2430.3 "Classification of Hazardous Areas– Specific Occupancies." where the diameter of the gas meter regulator relief opening exceeds 50mm then the 500mm distance may need to be increased.
3. The top edge of the meter panel shall be not more than 2000mm above finished ground level.
4. Gas meters which protrude more than 300 mm from the wall shall not be installed below the electricity meter box.
5. Where 500mm minimum clearance can not be maintained, Australian Standards referring to hazardous locations may allow for alternative arrangements.

Figure 6.2 Meter Boxes Near Gas Meters

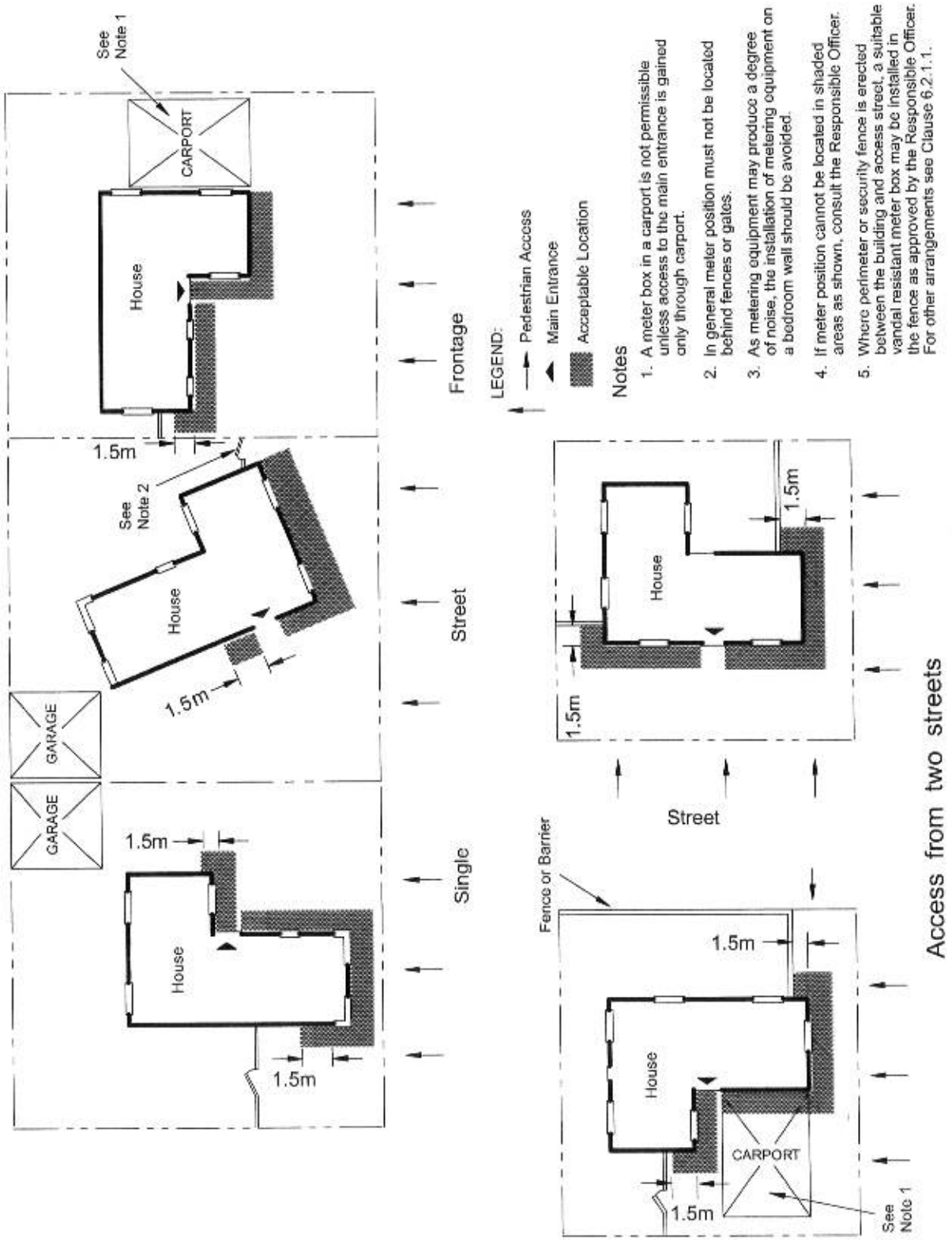
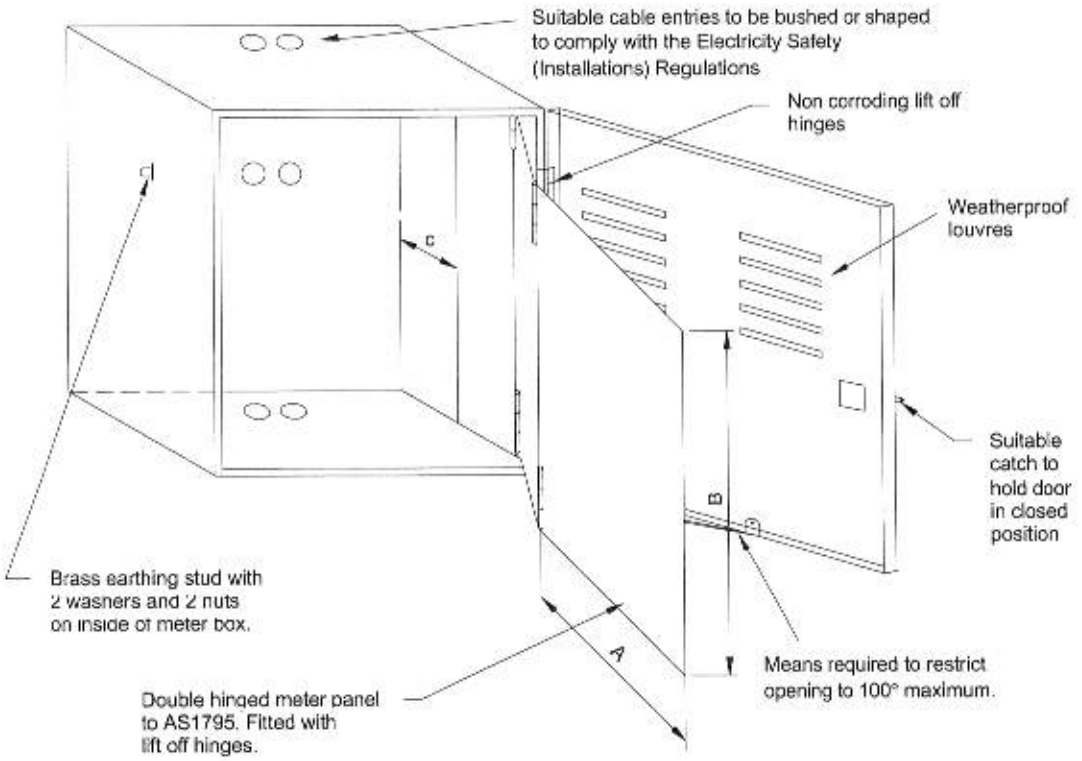


Figure 6.3 Individual Installations – Acceptable Meter Locations



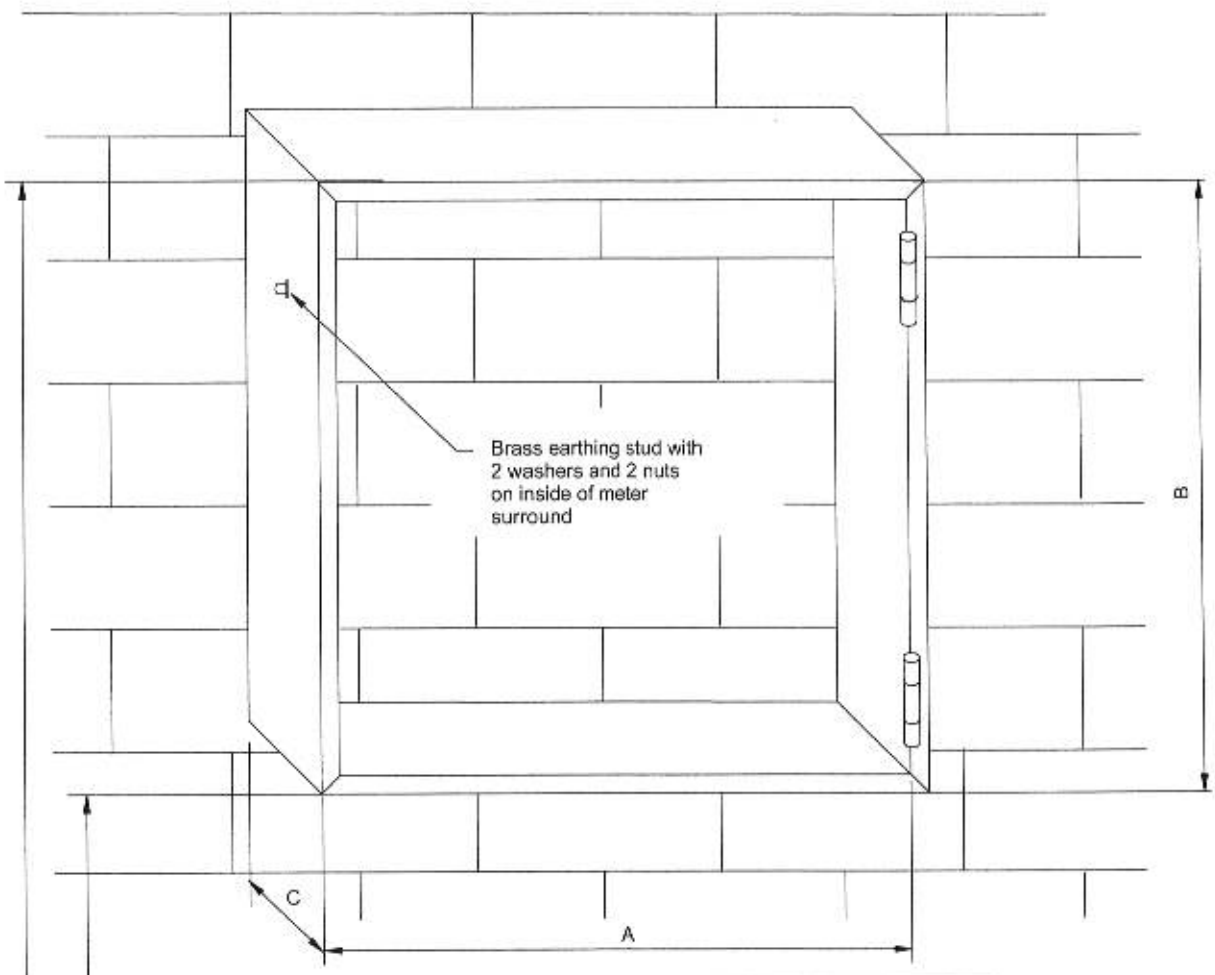
METER PANEL SIZE		INTERNAL DIMENSIONS	
'A'	'B'	Min. space in front of Meter Panel	Space Behind Meter Panel 'C'
400	380	180	
400	590	180	
590	400	180	In accordance with AS 3000 for hinged switchboard panels. Refer to Table 6.1 for conductor size limitations.
600	600	180	
600	900	180	
CT Metering Only			
600	900 *	240	

* Refer Clause 6.7.3

NOTES:

1. Suitable flashing may be required to prevent entry of moisture into box if the box is to be exposed to the weather. Particular attention should be paid to sealing around the door. The degree of protection shall be IP23 as defined in AS 1939. Adequate drain holes shall be provided in the bottom of the box.
2. Meter Box:– Constructed of galvanised sheet not less than 1.2mm thickness (or other acceptable metal sheet).
3. Refer to Clause 6.5.2 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 6.5.1, 6.6.3 and 6.6.4 for further details regarding meter box and panel requirements.

Figure 6.4 Meter Box - Metal



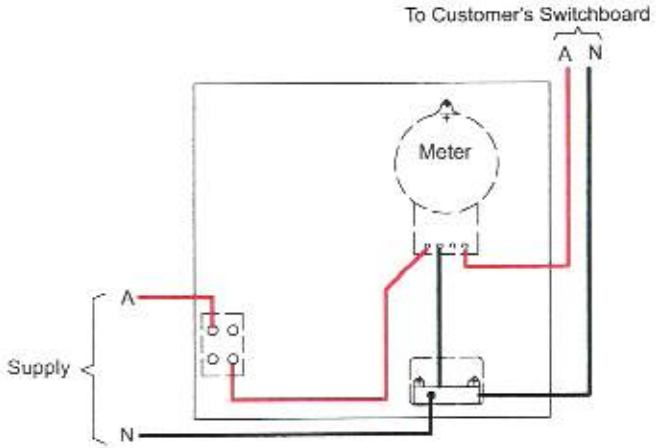
METER PANEL SIZE		SPACE BEHIND METER PANEL (INTERNAL DIMENSION)
'A'	'B'	'C'
400	380	In accordance with AS 3000 for hinged switchboard panels. Refer to Table 6.1 for conductor size limitations.
400	590	
590	400	
600	600	
600	900	
CT Metering Only		
600	900 *	

* Refer Clause 6.7.3

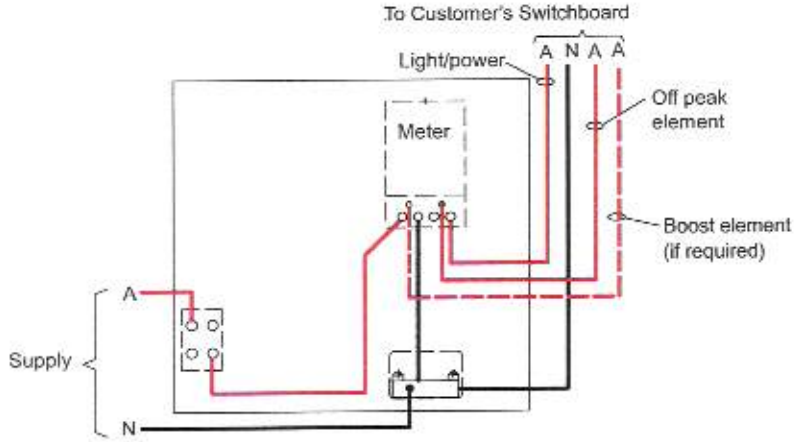
Notes:

1. Where installed on a conductive wall, insulating backing is required. In other cases backing is optional.
2. Where installed on a wall of combustible material, fire resistant lining shall be provided on the wall.
3. The customer shall supply and install the meter panel and mounting surround. The meter panel shall be fire resistant, hinged and capable of being lifted off. Refer to Clauses 6.5.1, 6.6.3 and 6.6.4 for further details regarding meter surround and panel requirements.
4. Mounting surround constructed of galvanised sheet not less than 1.2mm thickness (or other acceptable metal sheet).

Figure 6.5 Meter Panel, Mounting Surround - Metal



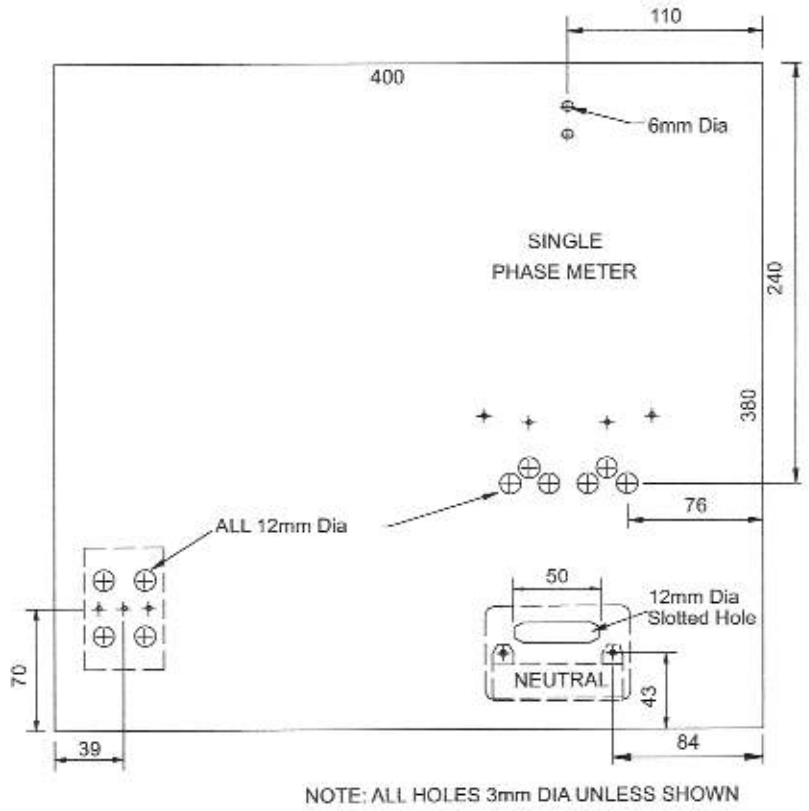
WIRING DIAGRAM
WITHOUT OFF PEAK LOAD



WIRING DIAGRAM
WITH OFF PEAK LOAD
ELECTRONIC METER

Notes

1. Meter panel fuse is not required for an overhead supply.
2. All metering neutrals minimum 2.5mm^2 stranded conductors.
3. Refer to fig 6.31 for meter template
4. Refer to Table 6.1 for conductor size limitations.

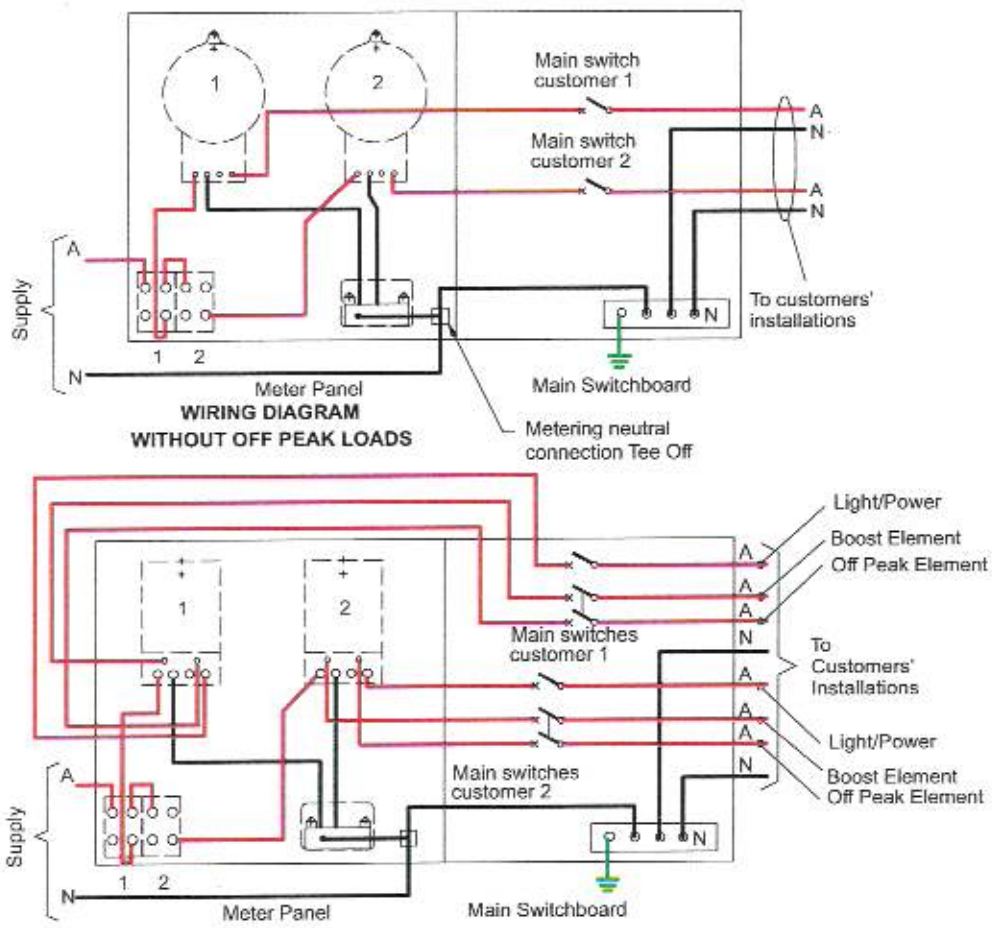


NOTE: ALL HOLES 3mm DIA UNLESS SHOWN

METER PANEL LAYOUT

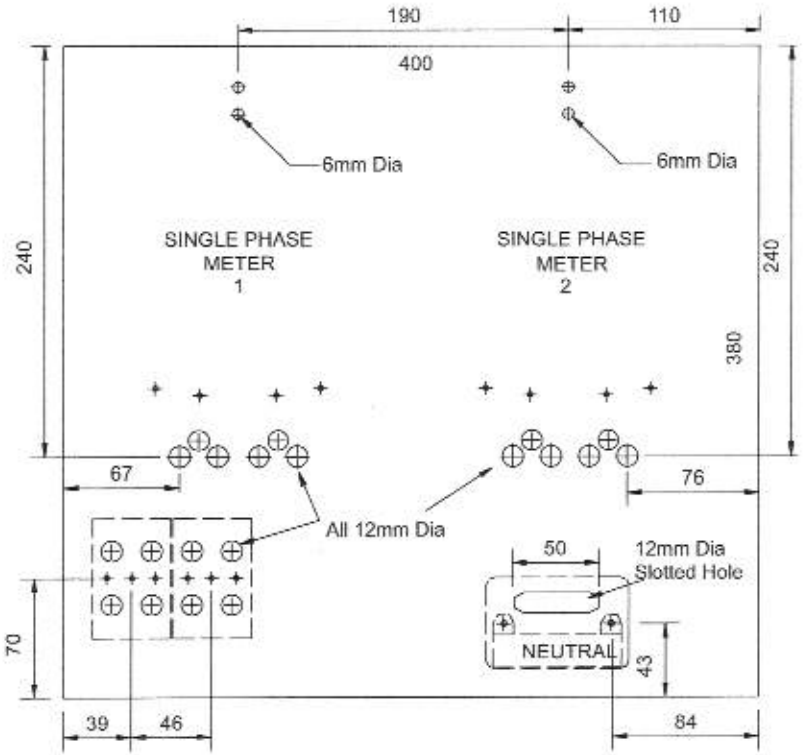
TYPICAL METERING DETAILS FOR ONE CUSTOMER
SINGLE PHASE WITH OR WITHOUT
OFF PEAK LOAD
PANEL SIZE 400mm W x 380mm H

Figure 6.6



WIRING DIAGRAM WITHOUT OFF PEAK LOADS

WIRING DIAGRAM 2x240V METERS WITH OFF PEAK LOADS ELECTRONIC METERS



NOTE: ALL HOLES 3mm DIA UNLESS SHOWN

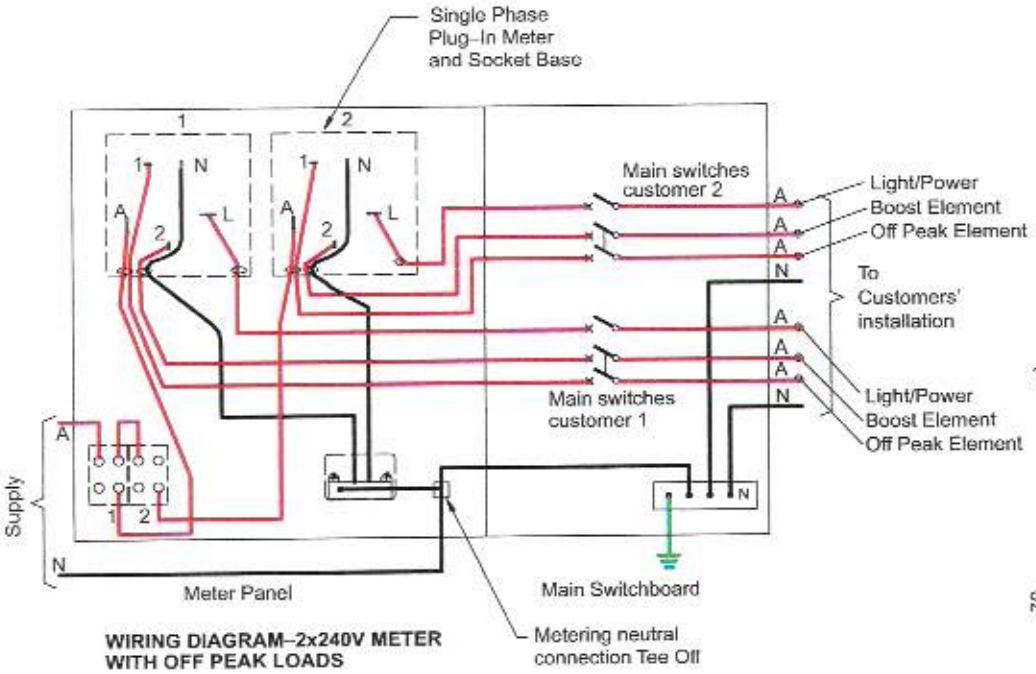
METER PANEL LAYOUT

Notes

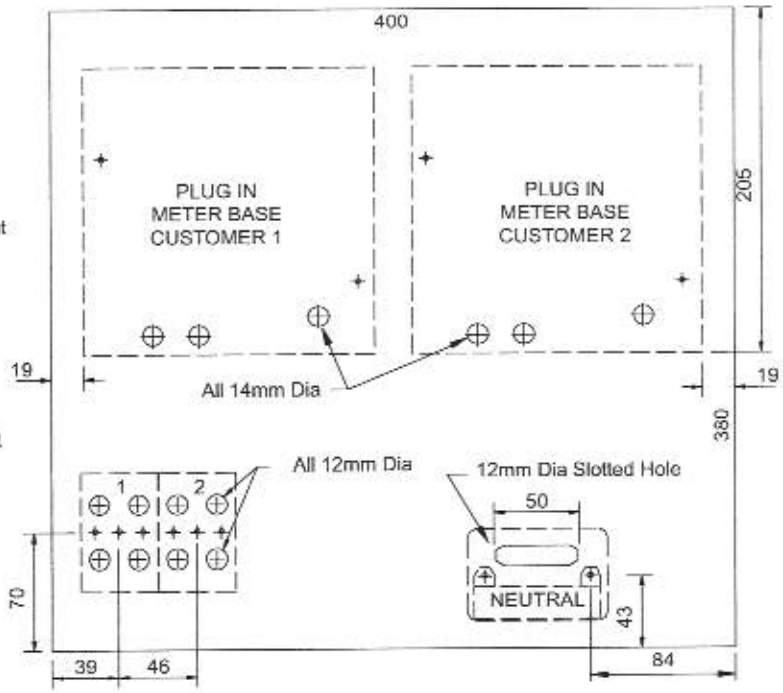
1. Meter panel fuse is required for each customer in overhead or underground supply areas.
2. All metering neutrals minimum 2.5mm^2 stranded conductors.
3. Refer to Fig. 6.31 for meter template.
4. Refer to Table 6.1 for conductor size limitations.

TYPICAL METERING DETAILS FOR TWO CUSTOMERS SINGLE PHASE WITH OR WITHOUT OFF PEAK LOADS. PANEL SIZE 400mm W x 380mm H

Figure 6.7



WIRING DIAGRAM–2x240V METER WITH OFF PEAK LOADS



NOTE: ALL HOLES 3mm DIA UNLESS SHOWN

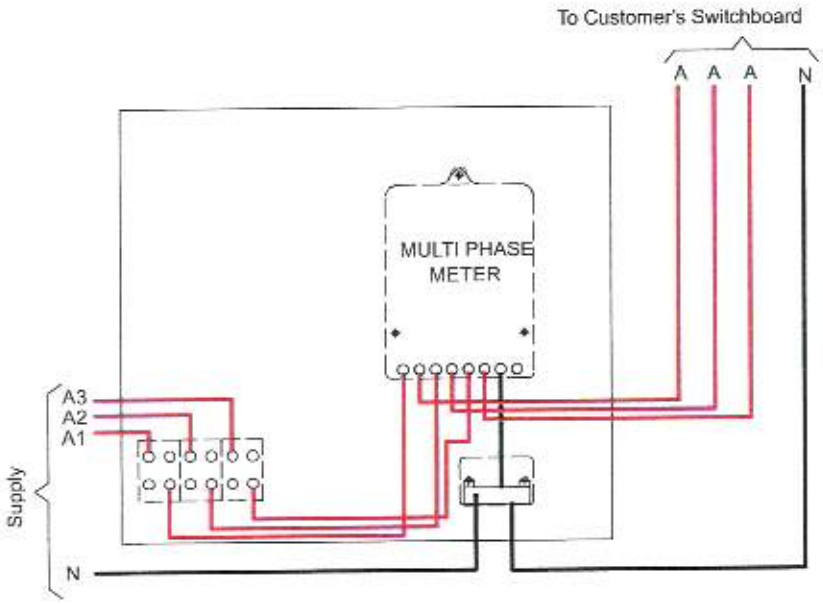
METER PANEL LAYOUT

Notes

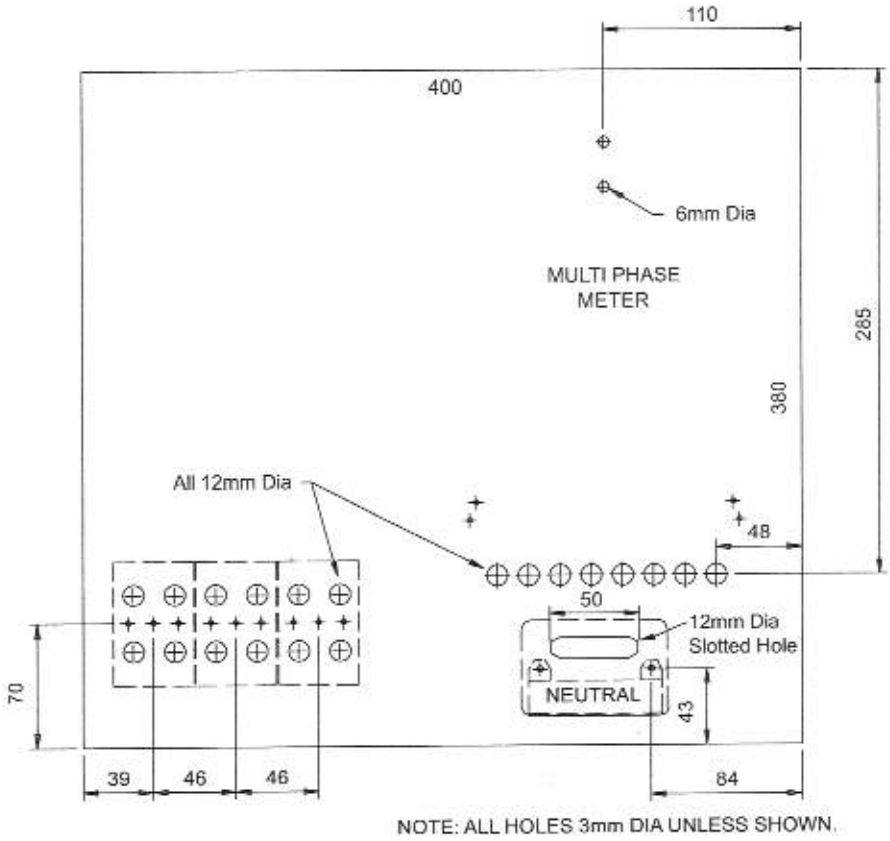
1. For single customer installation delete one meter and one fuse.
2. Meter panel fuse not required for single customer with overhead supply.
3. Meter panel fuse is required for each customer in overhead or underground supply areas.
4. All metering neutrals minimum 2.5mm^2 stranded conductors.
5. Refer to Table 6.1 for conductor size limitations.

TYPICAL METERING DETAILS FOR TWO CUSTOMERS SINGLE PHASE WITH PLUG–IN METERS. PANEL SIZE 400mm W x 380mm H

Figure 6.8



WIRING DIAGRAM



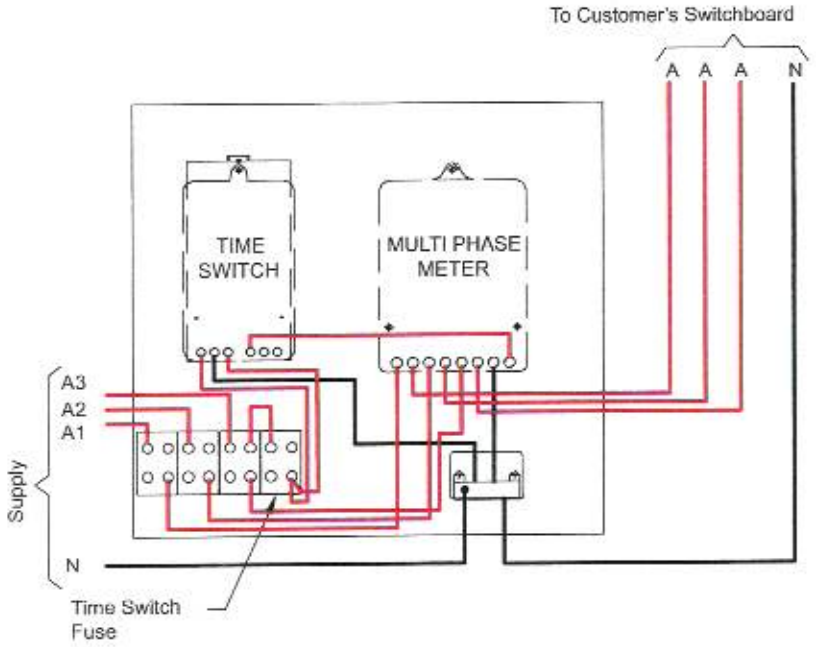
METER PANEL LAYOUT

Notes

1. Meter panel fuses are not required for an overhead supply.
2. All metering neutrals minimum 2.5mm^2 stranded conductors.
3. Refer to Fig 6.32 for meter template.
4. Refer to Table 6.1 for conductor size limitations.
5. Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.

TYPICAL METERING DETAILS FOR ONE CUSTOMER MULTIPHASE ONE RATE PANEL SIZE 400mm W x 380mm H

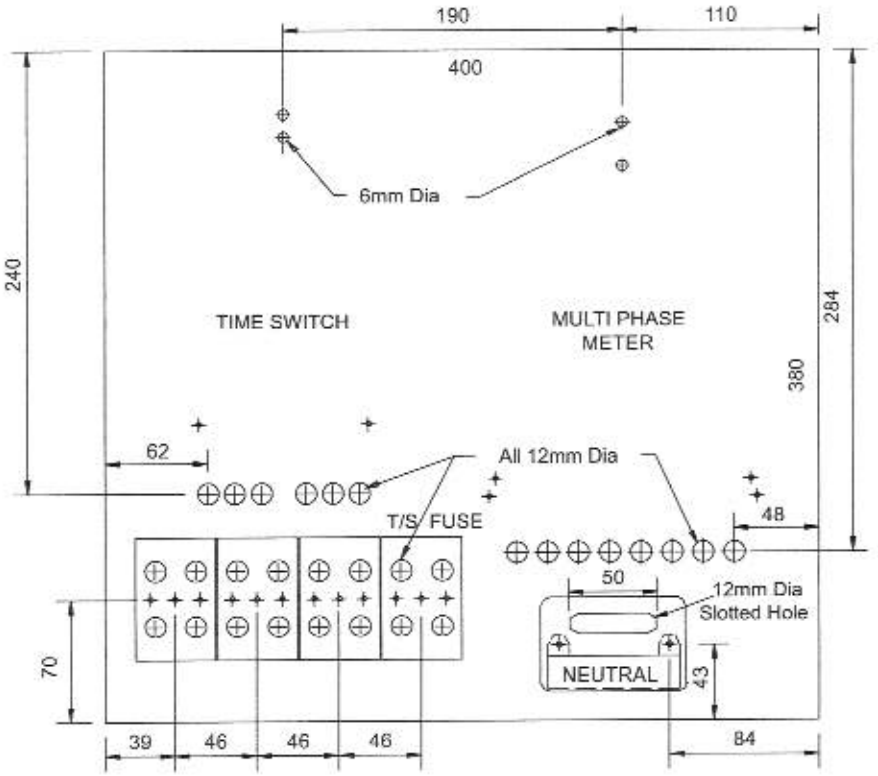
Figure 6.9



WIRING DIAGRAM

Notes

1. Meter panel fuses are not required for an overhead supply.
2. All time switch wiring and metering neutrals minimum 2.5mm^2 stranded conductors.
3. Time switch fuse is required for all installations other than domestic.
4. Refer to Fig. 6.32 and 6.33 for meter and time switch templates.
5. Refer to Table 6.1 for conductor size limitations.
6. Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.

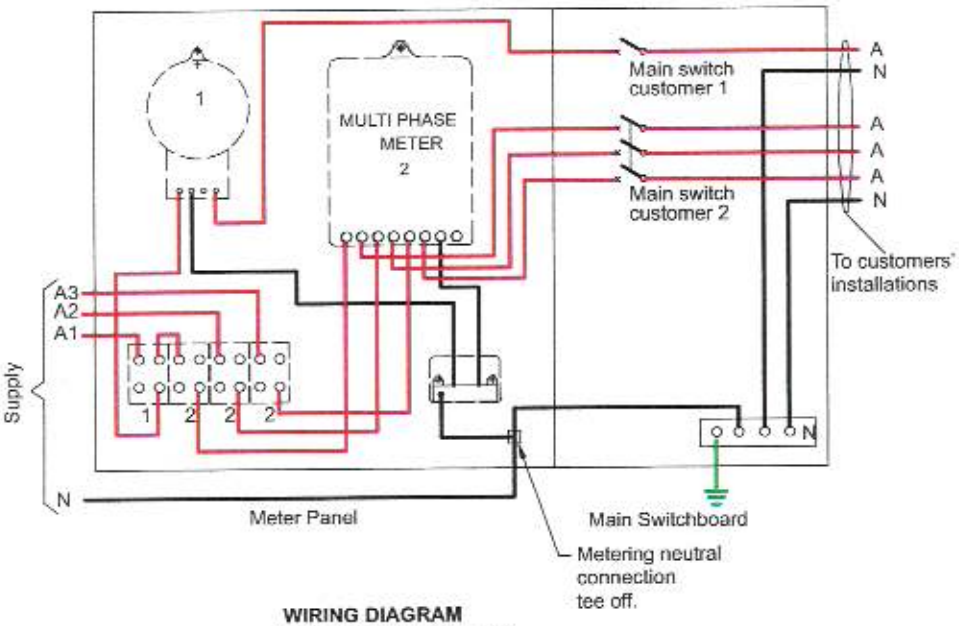


NOTE: ALL HOLES 3mm DIA UNLESS SHOWN.

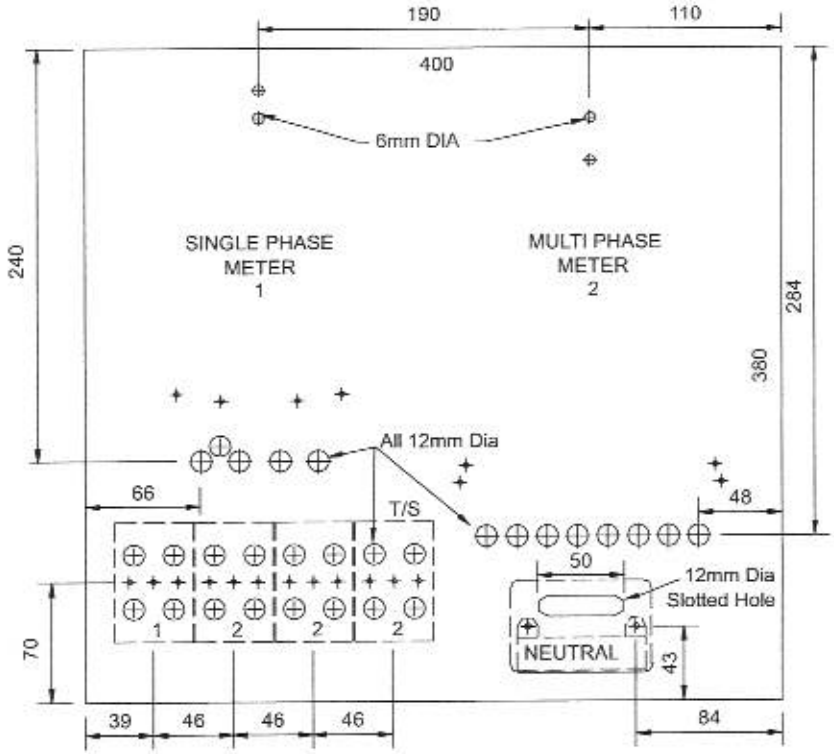
METER PANEL LAYOUT

TYPICAL METERING DETAILS FOR ONE CUSTOMER MULTIPHASE 2 RATE PANEL SIZE 400mm W x 380mm H

Figure 6.10



WIRING DIAGRAM FOR TWO CUSTOMERS



NOTE: ALL HOLES 3mm DIA UNLESS SHOWN.

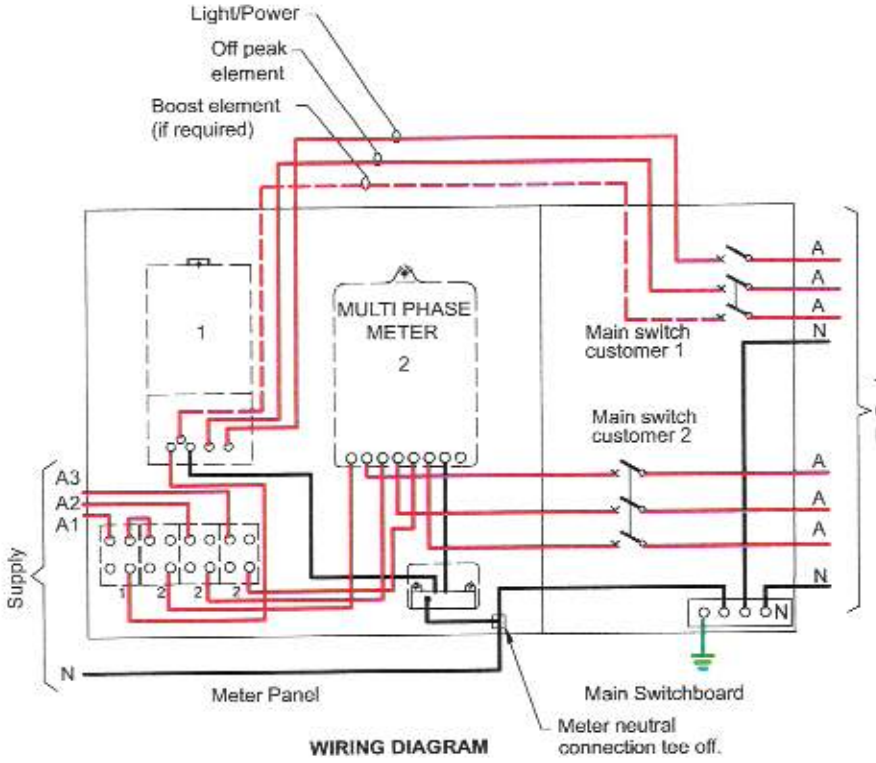
METER PANEL LAYOUT

Notes

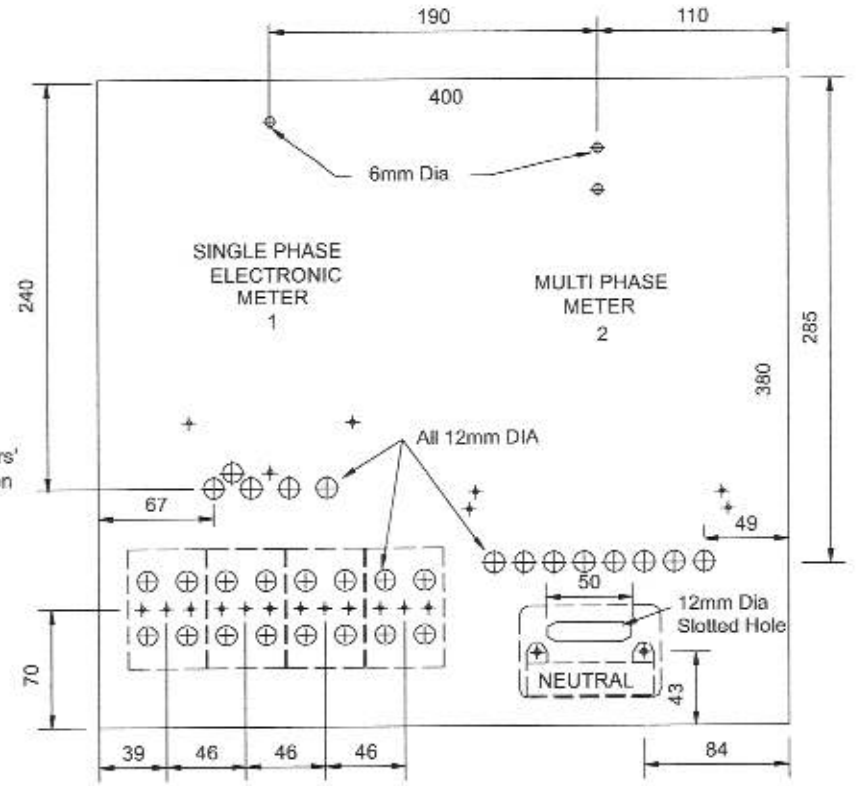
1. Meter panel fuses are required for each customer in overhead or underground supply areas.
2. All metering neutrals minimum 2.5mm^2 stranded conductors.
3. Refer to figures 6.31 and 6.32 for meter templates.
4. Refer to Table 6.1 for conductor size limitations.
5. Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.

TYPICAL METERING DETAILS FOR TWO CUSTOMERS 1– MULTIPHASE ONE RATE & 1– SINGLE PHASE ONE RATE METER PANEL SIZE 400mm W x 380mm H

Figure 6.11



WIRING DIAGRAM



NOTE: ALL HOLES 3mm DIA UNLESS SHOWN

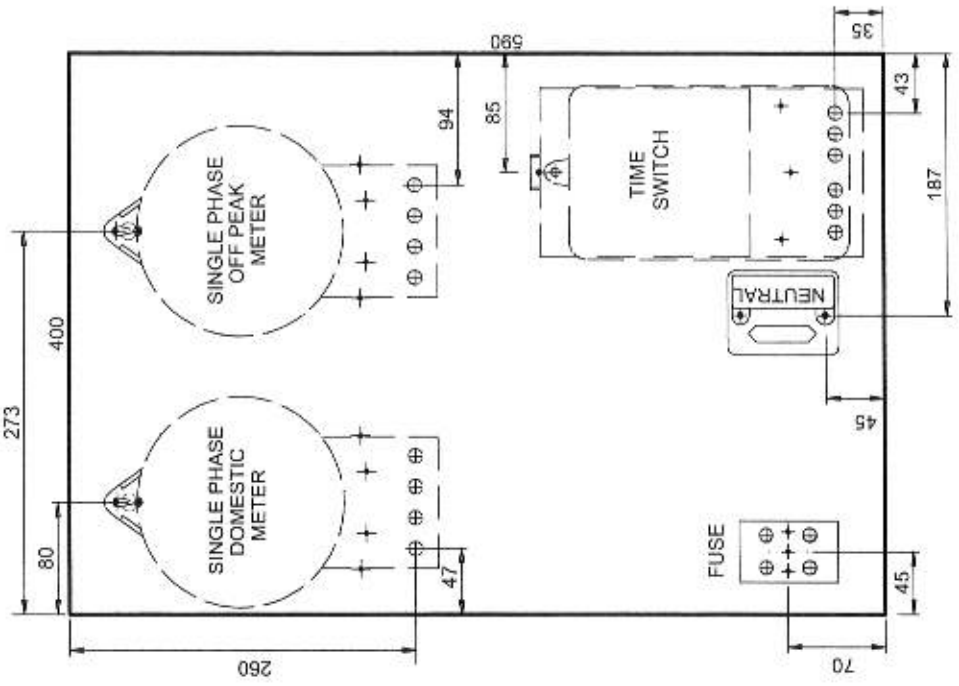
METER PANEL LAYOUT

Notes

1. Meter panel fuses are required for each customer in overhead or underground supply areas.
2. All metering neutrals minimum 2.5mm^2 stranded conductors.
3. Refer to Figures 6.31 & 6.32 for meter templates.
4. Refer to Table 6.1 for conductor size limitations.
5. Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.

TYPICAL METERING DETAILS FOR TWO CUSTOMERS 1– MULTIPHASE ONE RATE AND 1– SINGLE PHASE ELECTRONIC METER WITH OFF PEAK LOAD PANEL SIZE 400mm W x 380mm H

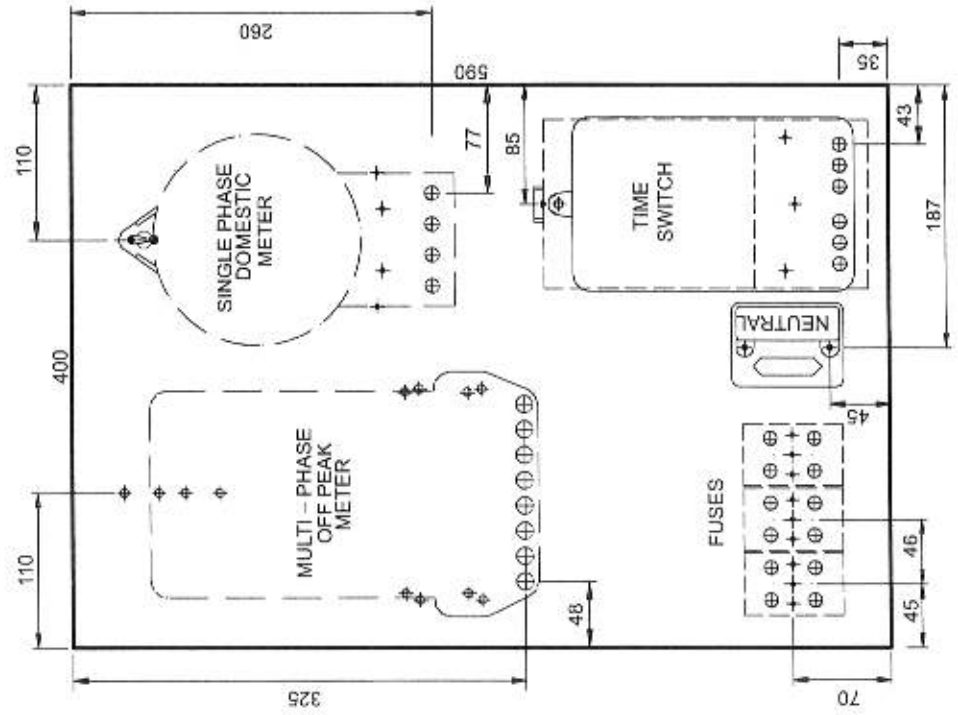
Figure 6.12



TYPICAL METER PANEL LAYOUT
1 CUSTOMER SINGLE PHASE
TWO OFF PEAK LOADS

(WIRING DIAGRAM 6.20)

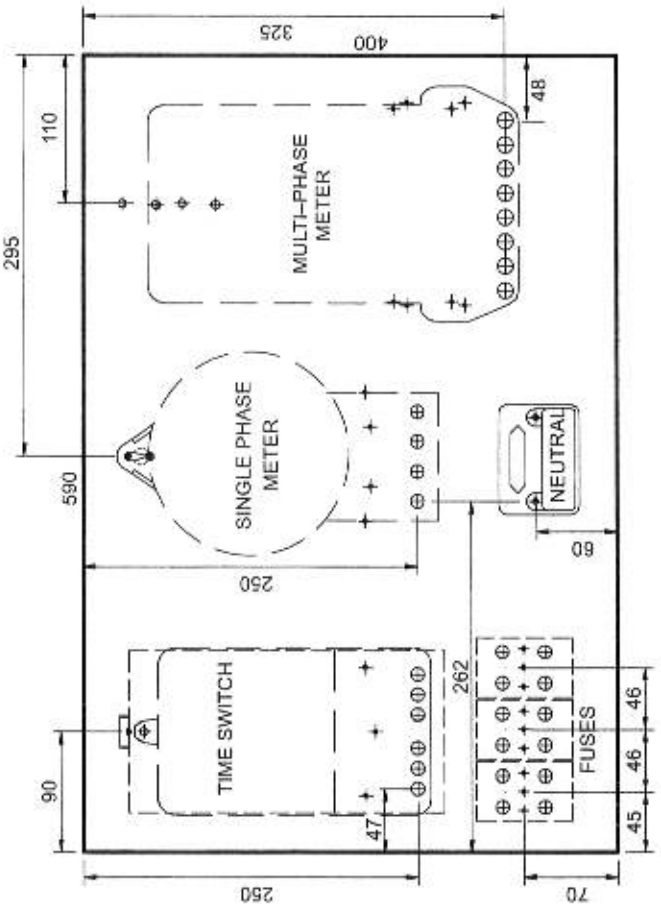
Note Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.



TYPICAL METER PANEL LAYOUT
1 CUSTOMER MULTI PHASE
TWO OFF PEAK LOADS

(WIRING DIAGRAM 6.21)

Figure 6.13

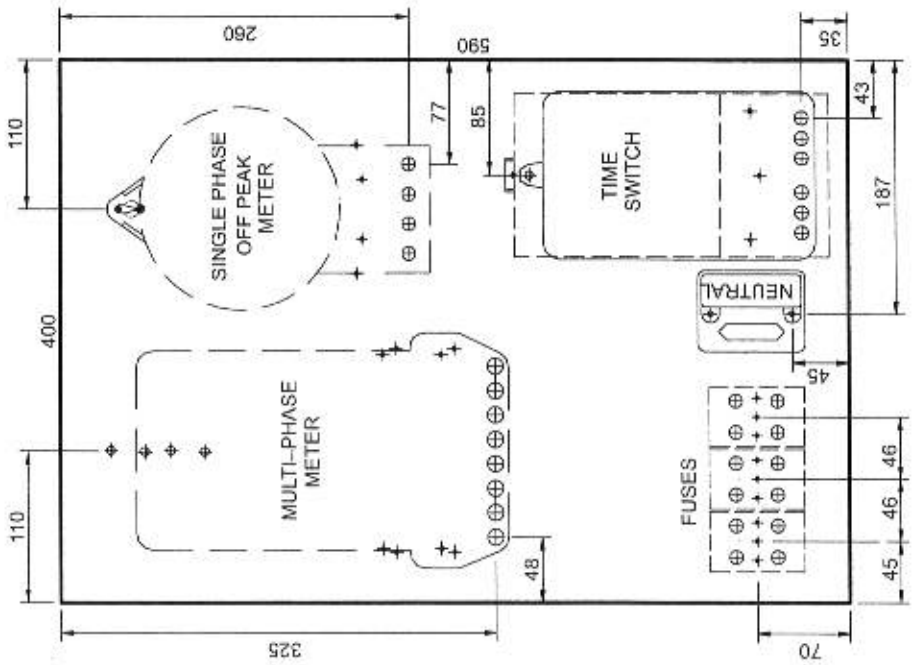


HORIZONTAL LAYOUT

(WIRING DIAGRAM FIG 6.23)

TYPICAL METER PANEL LAYOUT
1 CUSTOMER
MULTI PHASE
WINNER
WITH OFF PEAK LOADS

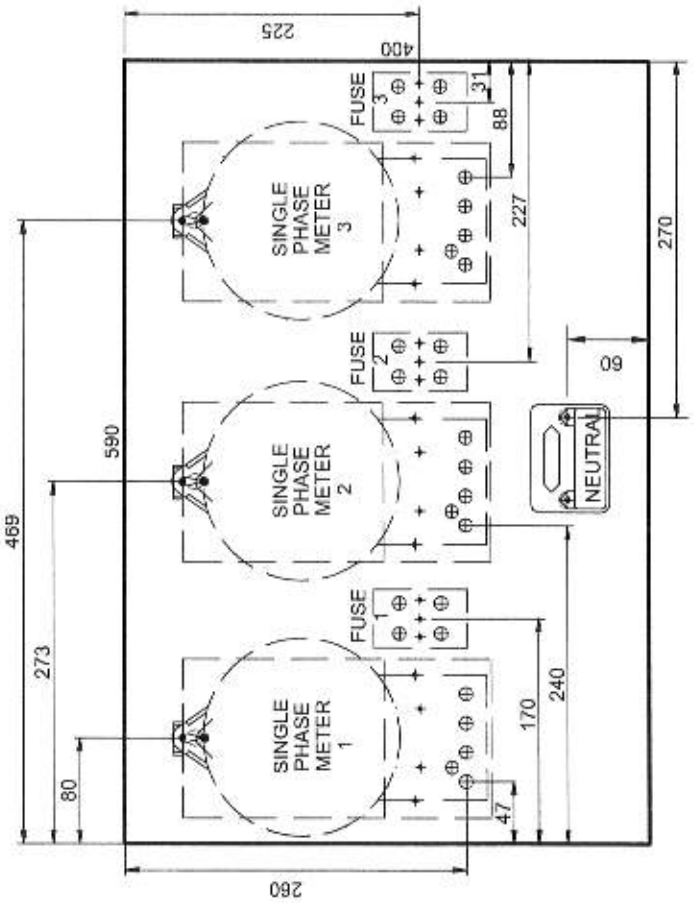
Note Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.



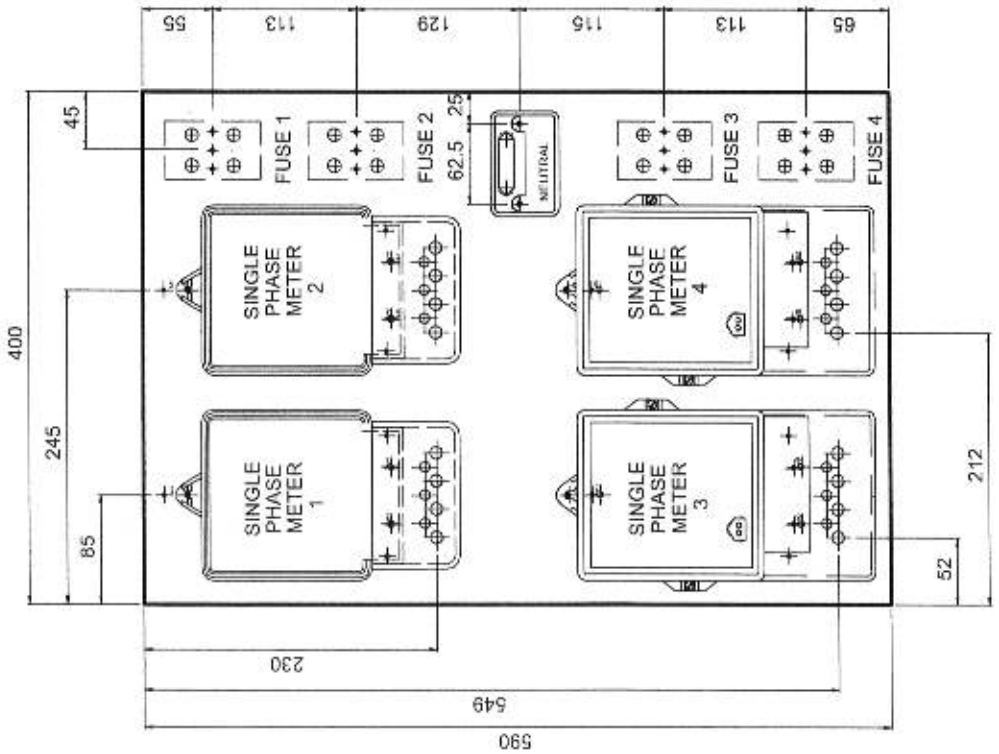
VERTICAL LAYOUT

(WIRING DIAGRAM fig 6.22)

Figure 6.14



TYPICAL METER PANEL LAYOUT
3 CUSTOMERS SINGLE PHASE
1 RATE or ELECTRONIC
(WIRING DIAGRAM – FIG 6.24)



TYPICAL METER PANEL LAYOUT
4 CUSTOMERS SINGLE PHASE
1 RATE or ELECTRONIC
(WIRING DIAGRAM – FIG 6.25)

Figure 6.15

TYPICAL METER PANEL LAYOUT
6 CUSTOMERS SINGLE PHASE
1 RATE or ELECTRONIC

(WIRING DIAGRAM 6.26)

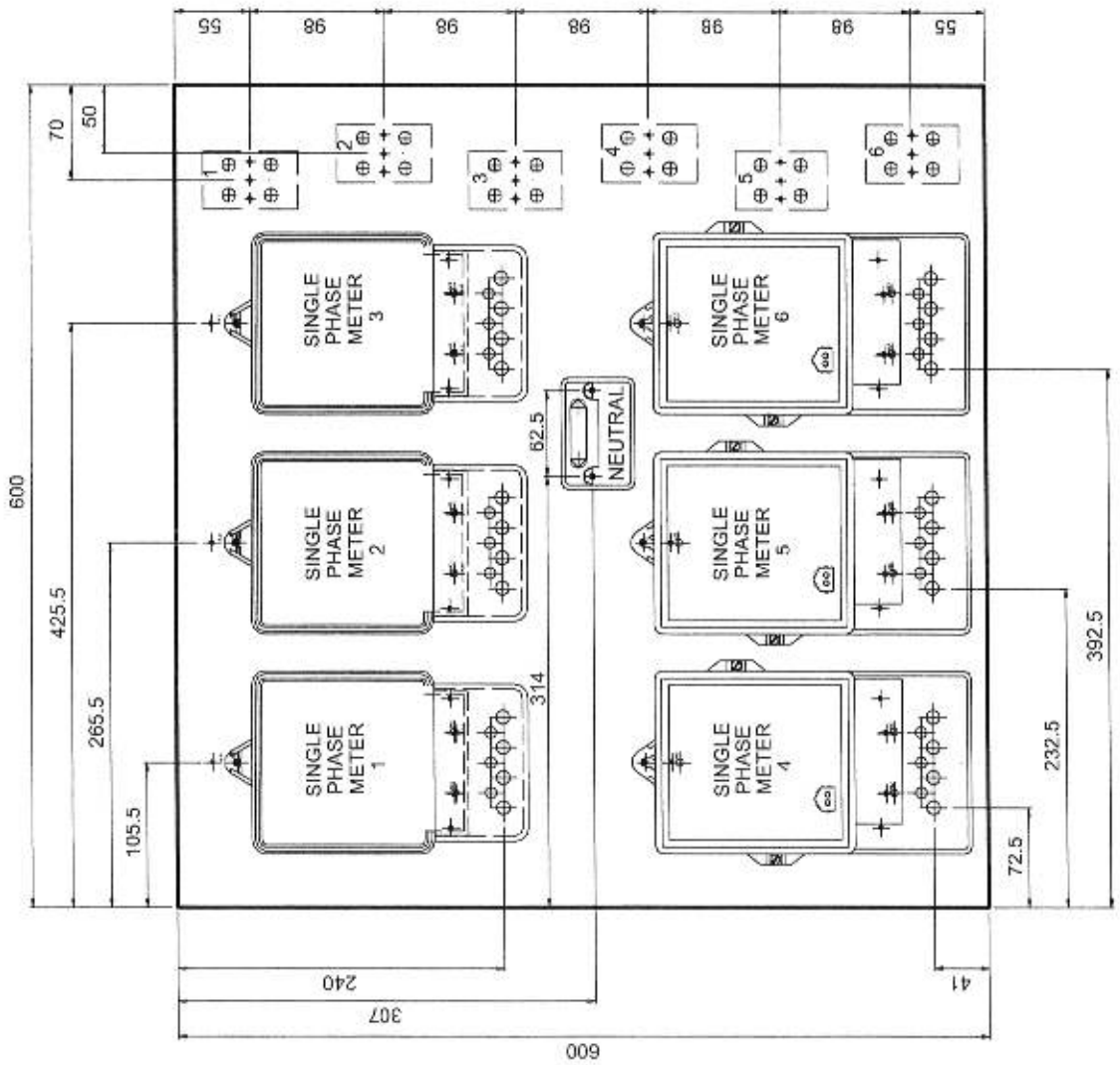


Figure 6.16

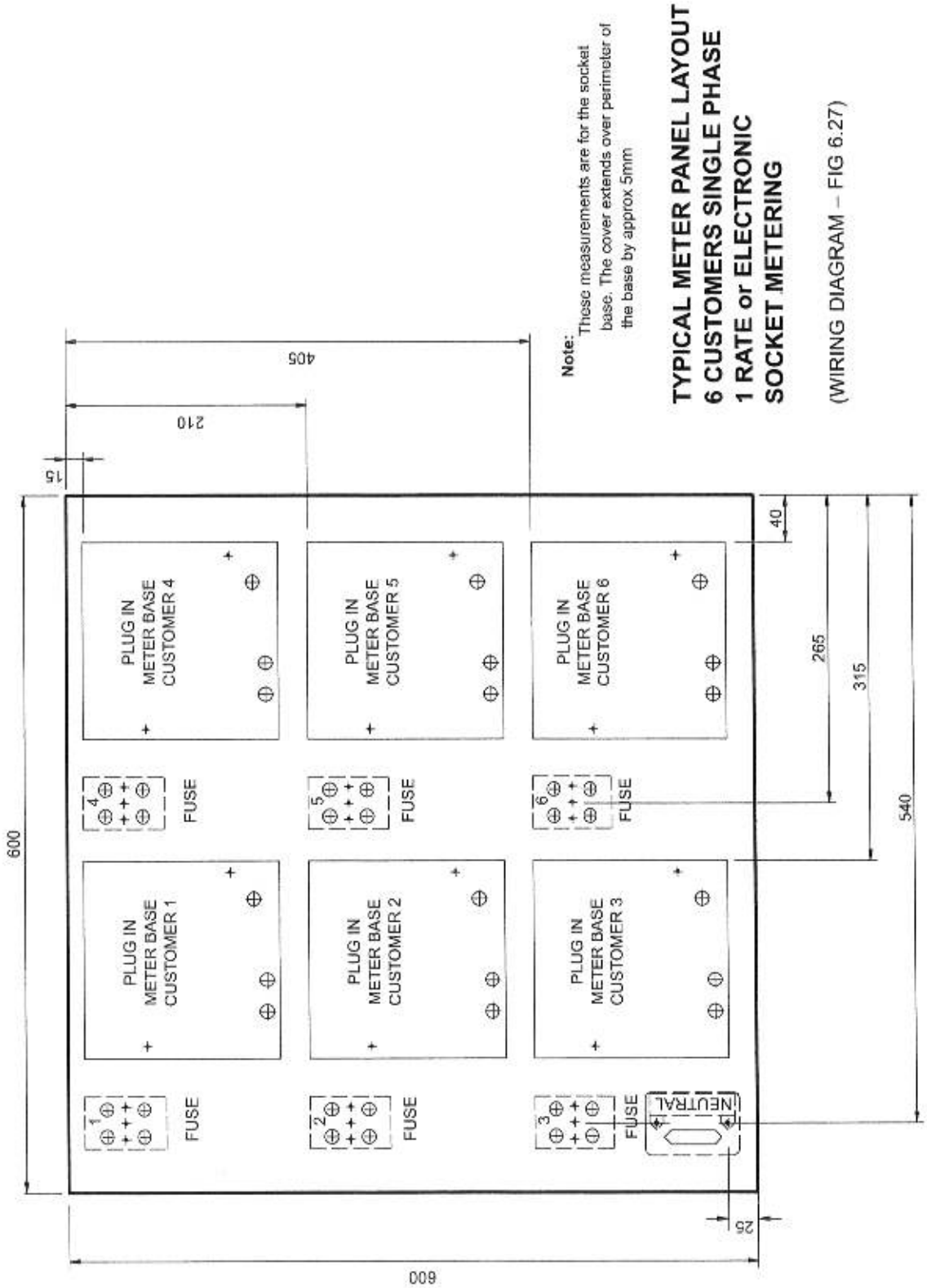
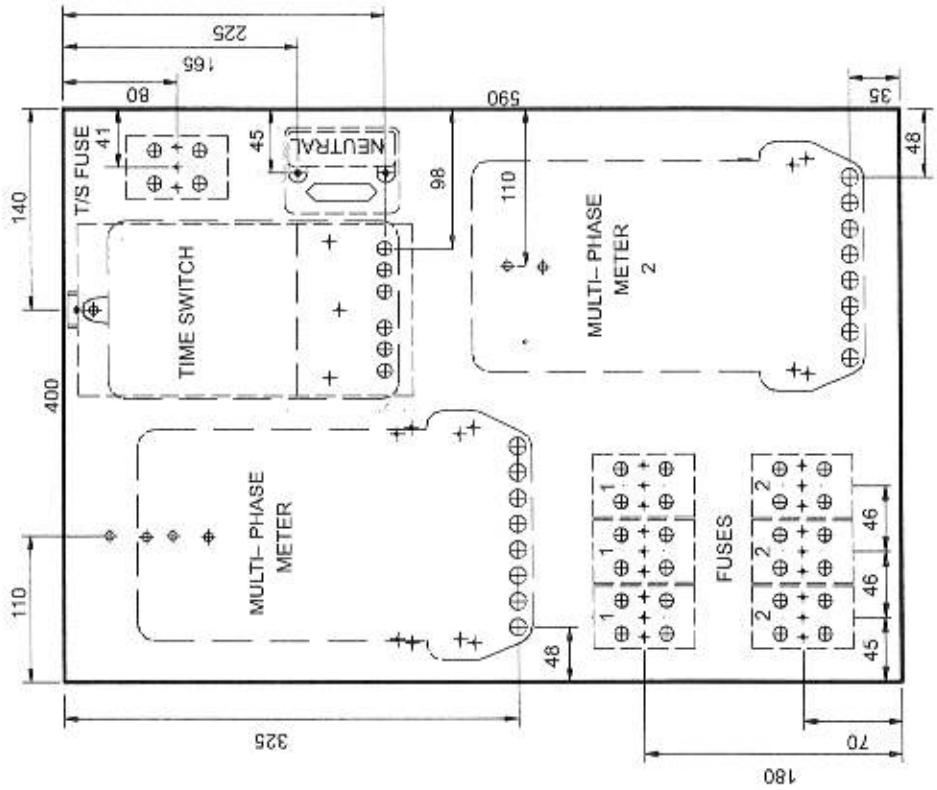


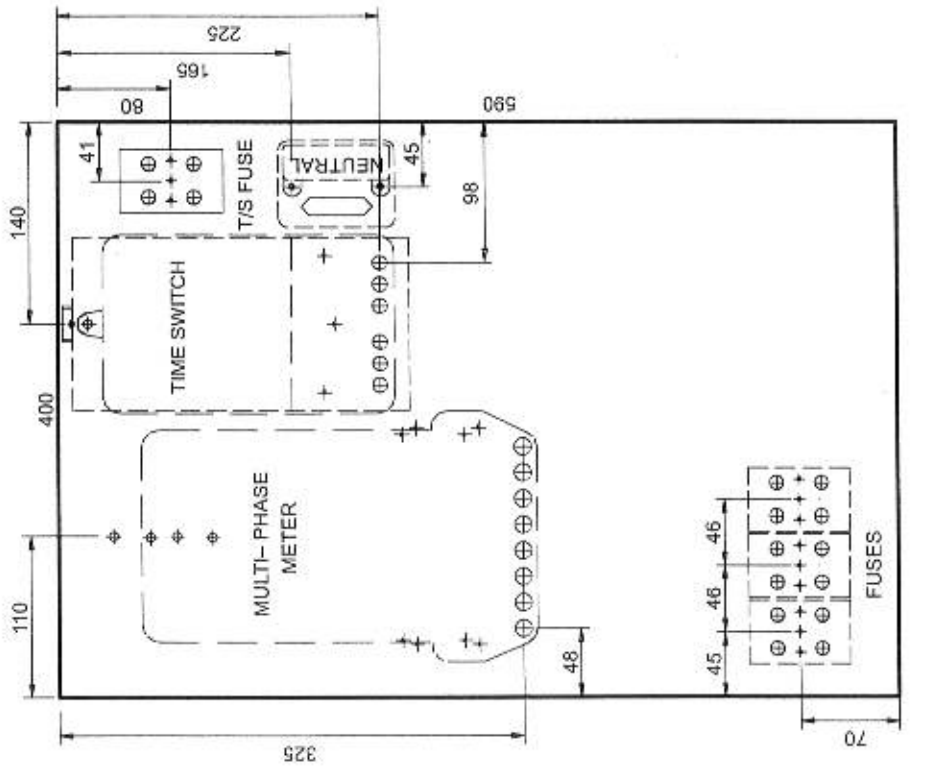
Figure 6.17



TYPICAL METER PANEL LAYOUT
2 CUSTOMERS
MULTI PHASE 1 or 2 RATE

(WIRING DIAGRAM FIG 6.29)

Note Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.



TYPICAL METER PANEL LAYOUT
1 CUSTOMER
MULTI PHASE 1 or 2 RATE

(WIRING DIAGRAM FIG 6.28)

Figure 6.18

Note

Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommadate this spacing, a larger meter panel may be necessary.

TYPICAL METER PANEL LAYOUT
3 CUSTOMERS MULTI PHASE
1 or 2 RATE

(WIRING DIAGRAM FIG 6.30)

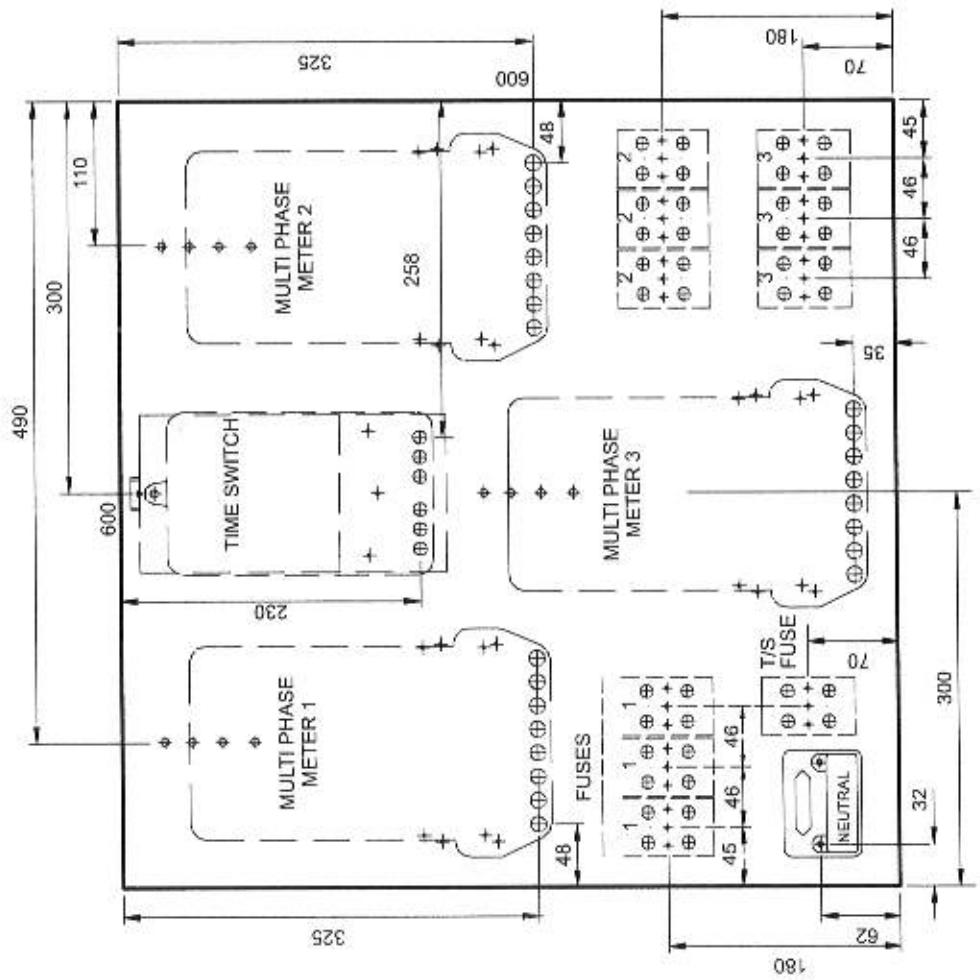
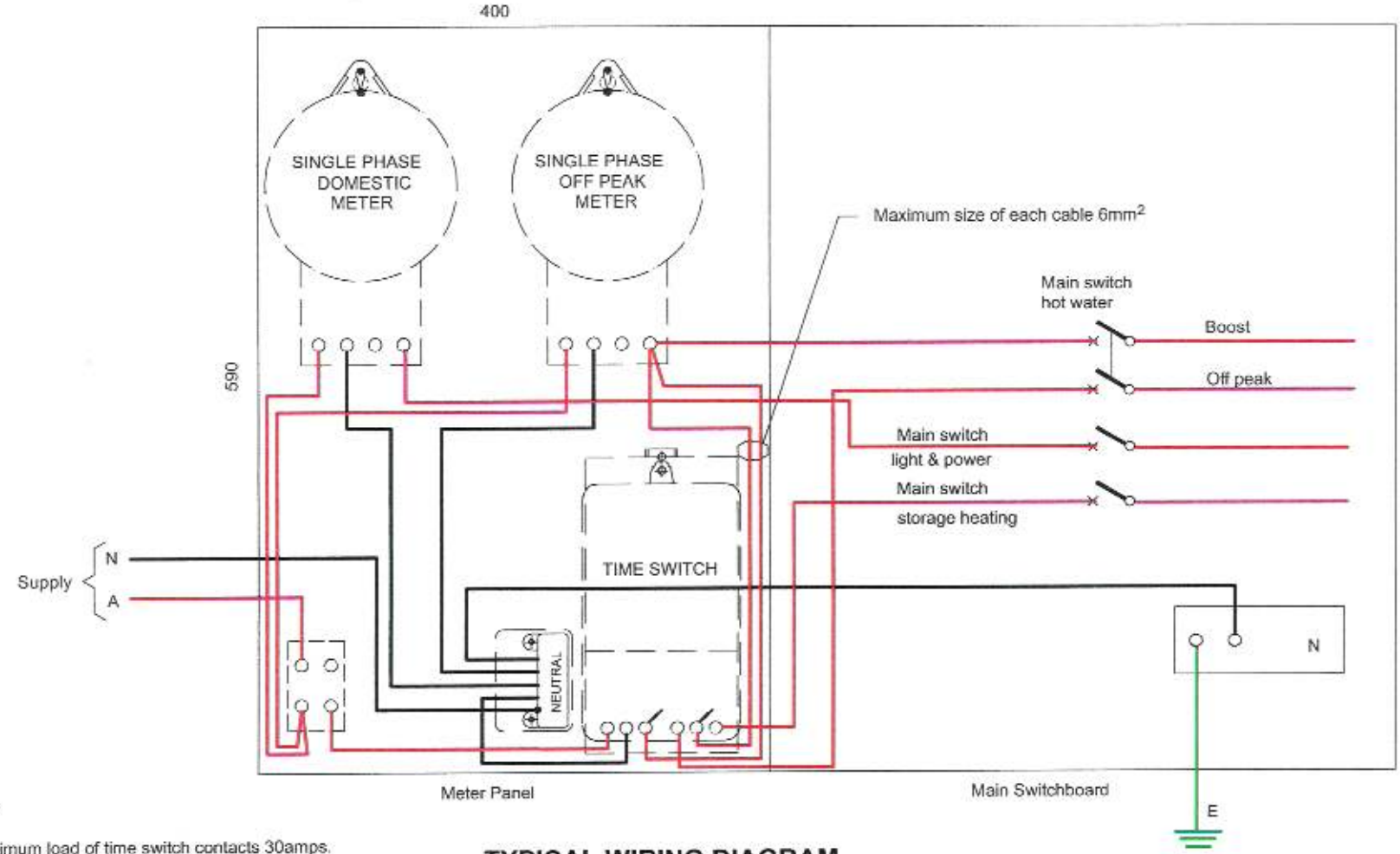


Figure 6.19

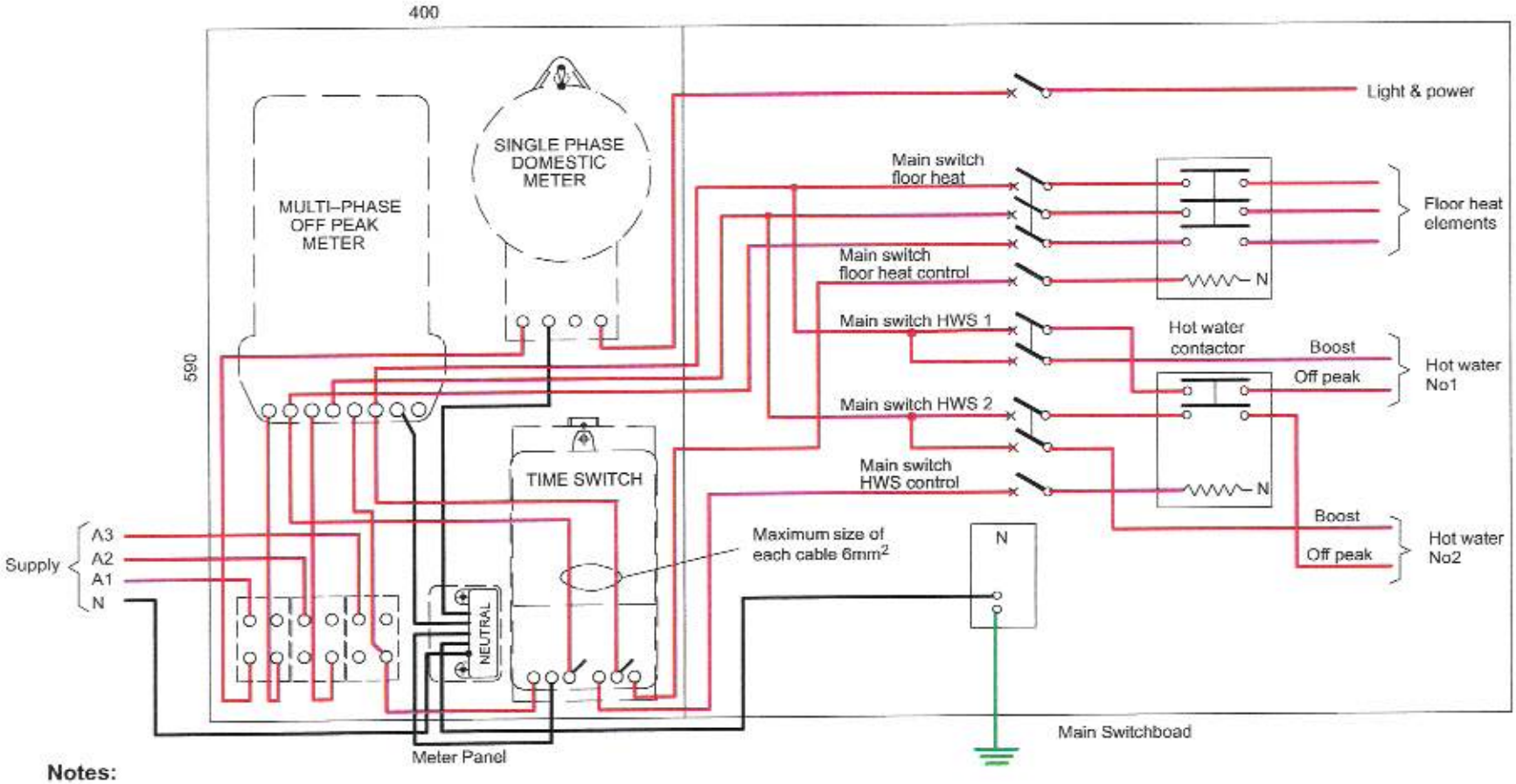


Notes

1. Maximum load of time switch contacts 30amps. For switching loads exceeding 30A refer Fig 6.21.
2. All metering neutrals minimum 2.5mm² stranded conductors.
3. Meter panel fuse is not required for an overhead supply.
4. Refer to Table 6.1 for conductor size limitations.

TYPICAL WIRING DIAGRAM
SINGLE PHASE STORAGE HEATING & TWIN ELEMENT OFF PEAK HOT WATER SERVICE.
PANEL SIZE 400mm W x 590mm H

Figure 6.20

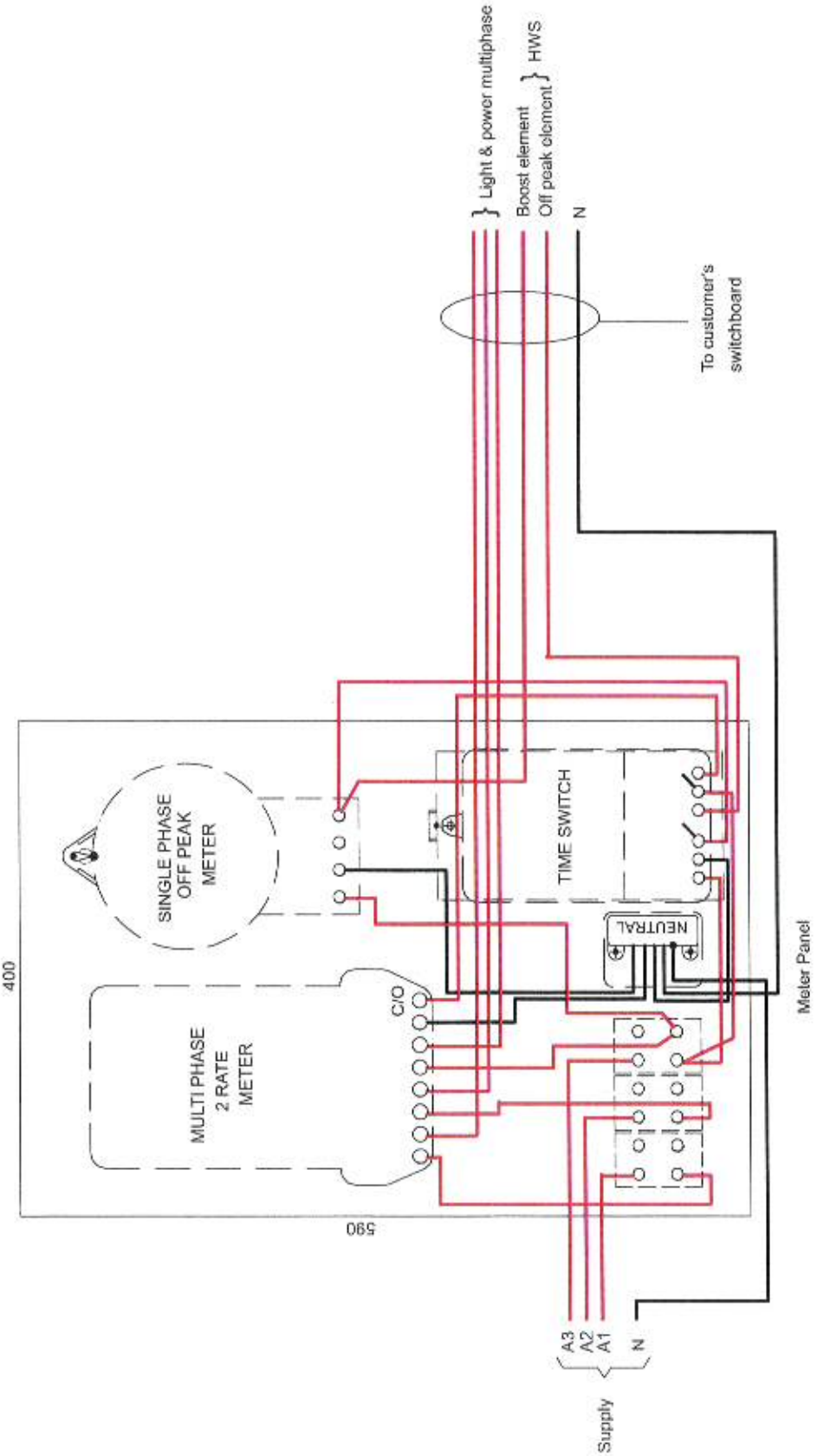


Notes:

1. Maximum load of time switch contacts 30A.
2. Contactor coils 240v.
3. For clarity control thermostats not shown.
4. All metering neutrals minimum 2.5mm^2 stranded conductors. Refer to Clause 6.2.2 for load carrying conductors.
5. Meter panel fuses are not required for an overhead supply.
6. Refer Clause 4.8.2 re Balancing of Load.
7. Refer to Table 6.1 for conductor size limitations.

TYPICAL WIRING DIAGRAM
MULTI PHASE FLOOR HEATING & TWO TWIN ELEMENT OFF PEAK HOT WATER SERVICES.
PANEL SIZE 400mm W x 590mm H

Figure 6.21

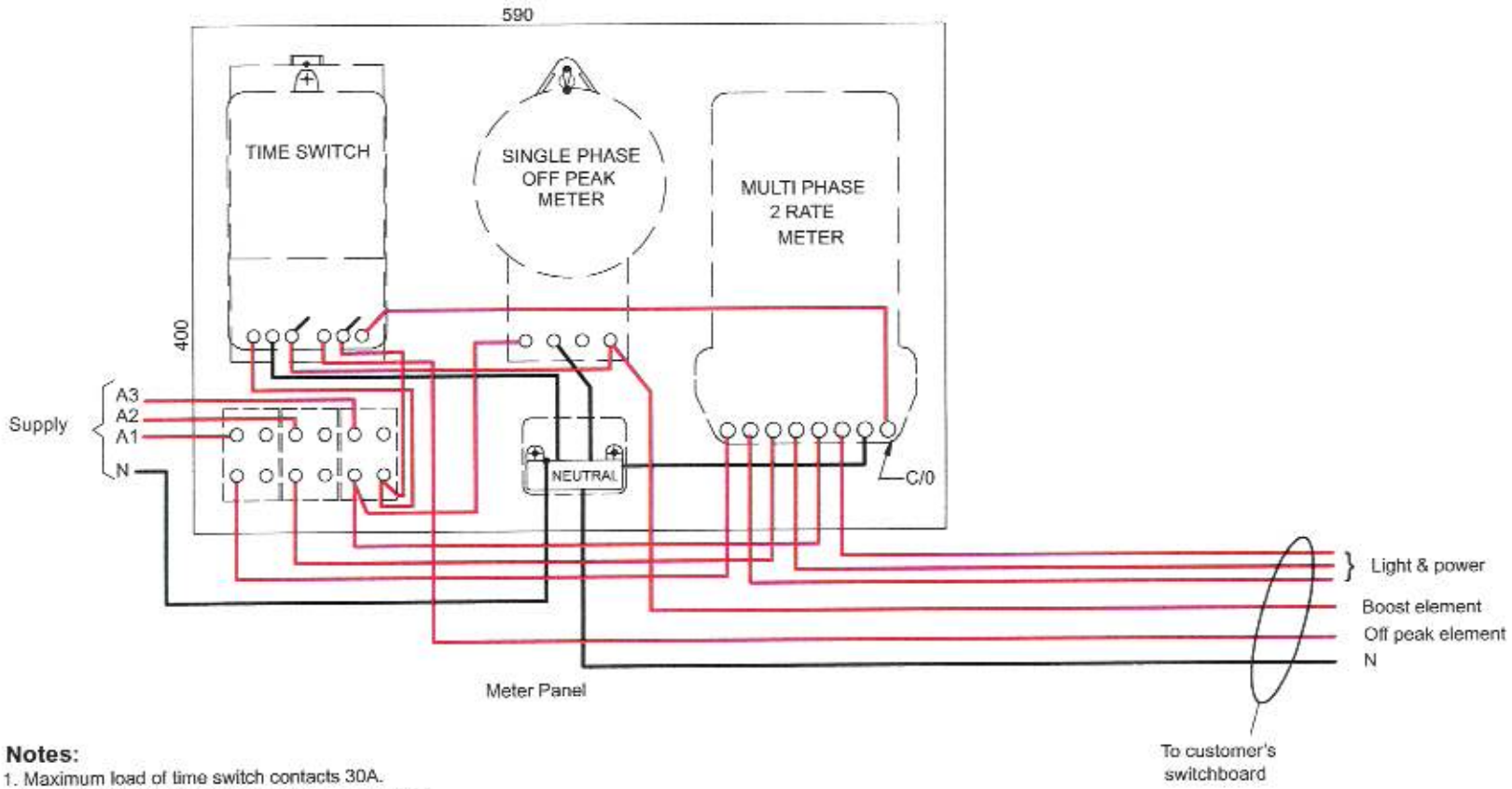


TYPICAL WIRING DIAGRAM.
MULTIPHASE WINNER WITH OFF PEAK LOAD
PANEL SIZE 400mm W x 590mm H

Figure 6.22

Notes:

1. Maximum load of time switch contacts 30A.
   For switching loads exceeding 30A refer Fig. 6.21.
2. Meter panel fuses are not required for an overhead supply.
3. All time switch wiring and metering neutrals min. 2.5mm² stranded conductors.
   Refer to Clause 6.2.2 for load carrying conductors.
4. Refer to Table 6.1 for conductor size limitations.

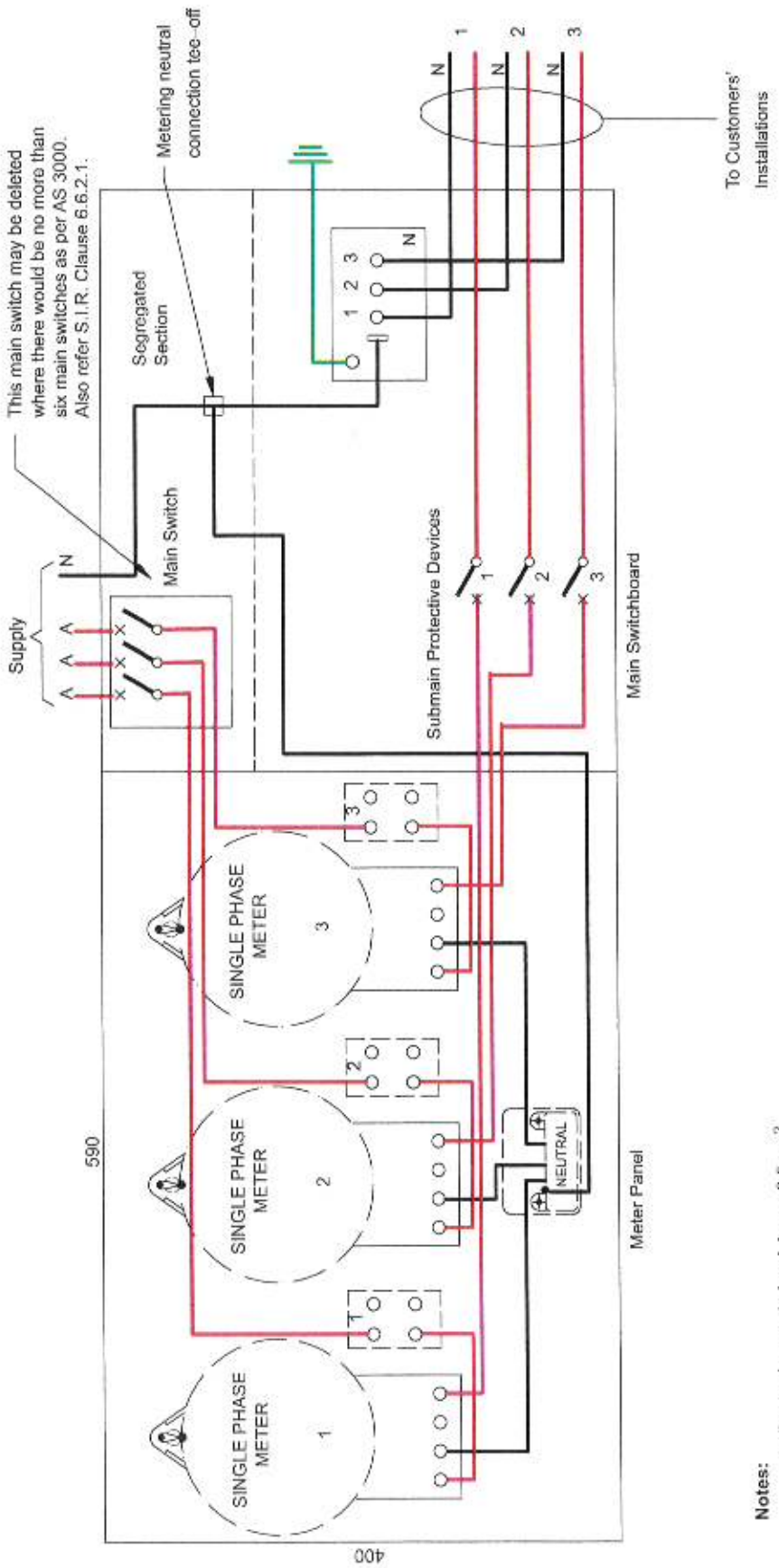


Notes:

1. Maximum load of time switch contacts 30A.
   For switching loads exceeding 30A refer Fig. 6.21.
2. All time switch wiring and metering neutrals min. 2.5mm^2 stranded conductors.
   Refer to Clause 6.2.2 for load carrying conductors.
3. Meter panel fuses are not required for an overhead supply.
4. Refer to Table 6.1 for conductor size limitations.

TYPICAL WIRING DIAGRAM
MULTI PHASE WINNER WITH OFF PEAK LOAD
PANEL SIZE 590mm W x 400mm H

Figure 6.23

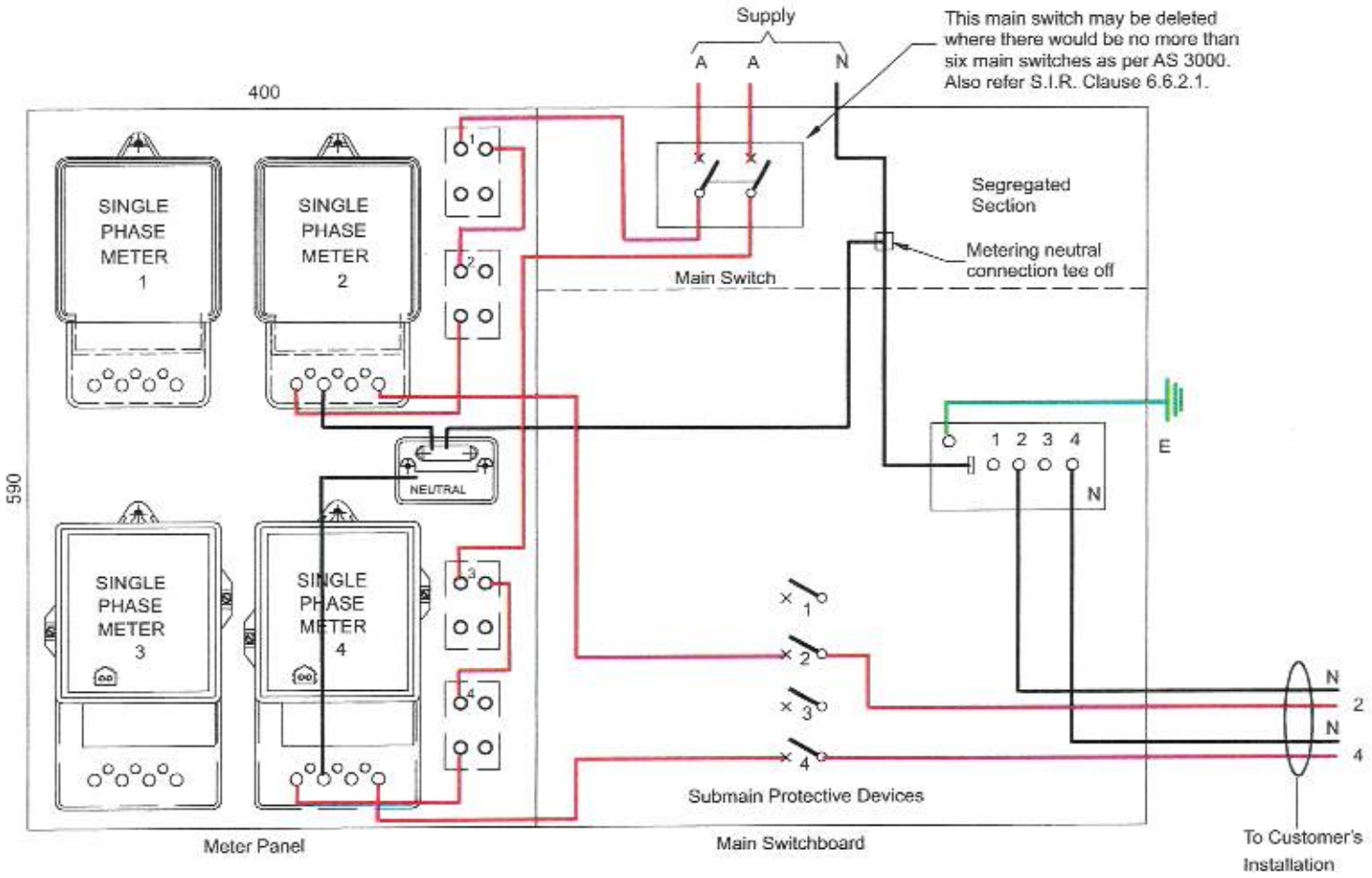


TYPICAL WIRING DIAGRAM
3 CUSTOMERS EACH SINGLE PHASE
PANEL SIZE 590mm W x 400mm H

Notes:

1. All metering neutrals minimum 2.5mm^2 stranded conductors.
2. For off peak loads refer figures 6–6 & 6–7.
3. Refer to Table 6.1 for conductor size limitations.

Figure 6.24

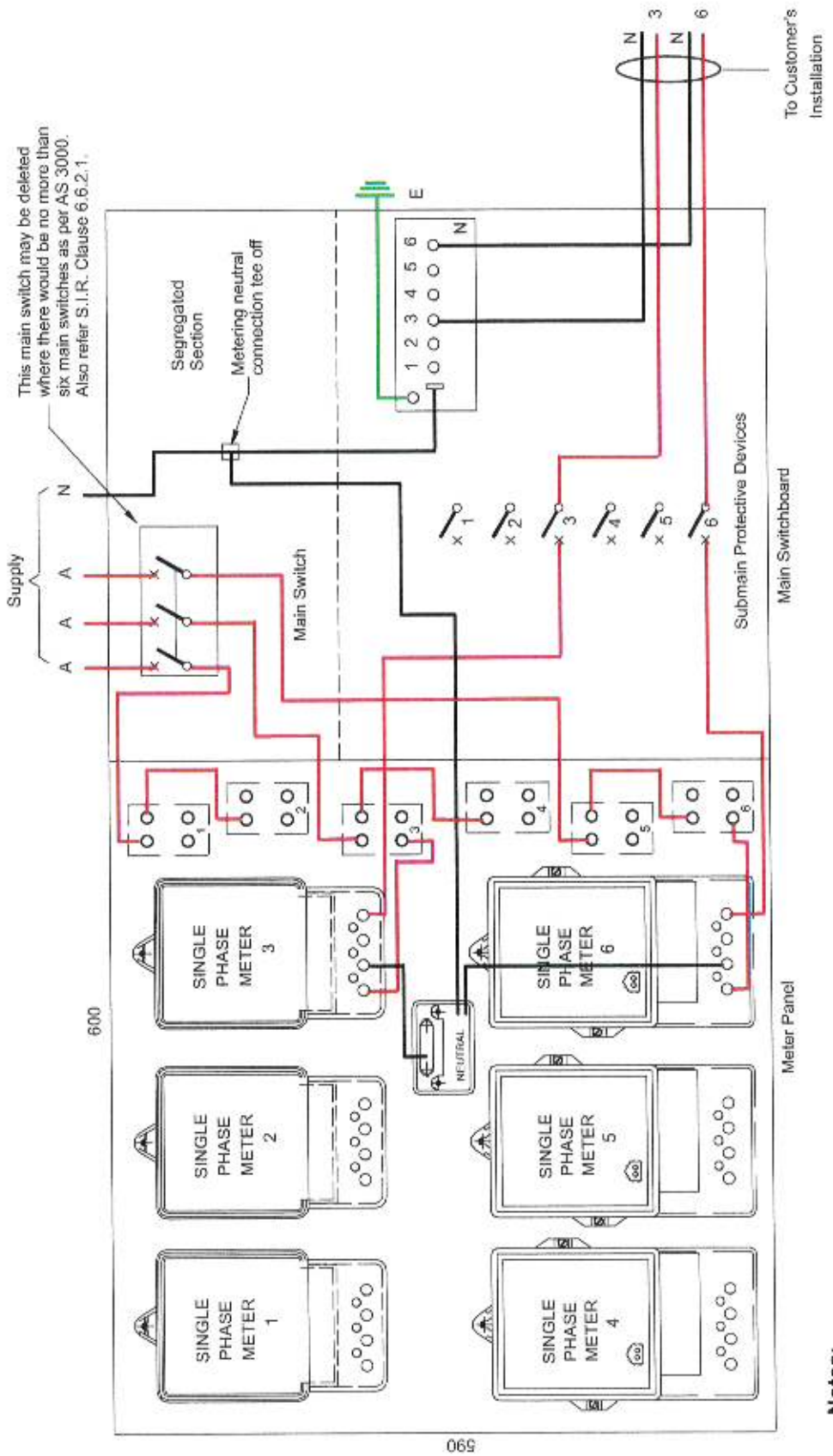


Notes:

1. All metering neutrals minimum 2.5mm^2 stranded conductors.
2. For off peak loads refer Figures 6–6 & 6–7.
3. For simplicity wiring shown only for customers 2 & 4.
4. Refer to Table 6.1 for conductor size limitations.

TYPICAL WIRING DIAGRAM
4 CUSTOMERS EACH SINGLE PHASE
PANEL SIZE 400mm W x 590mm H

Figure 6.25

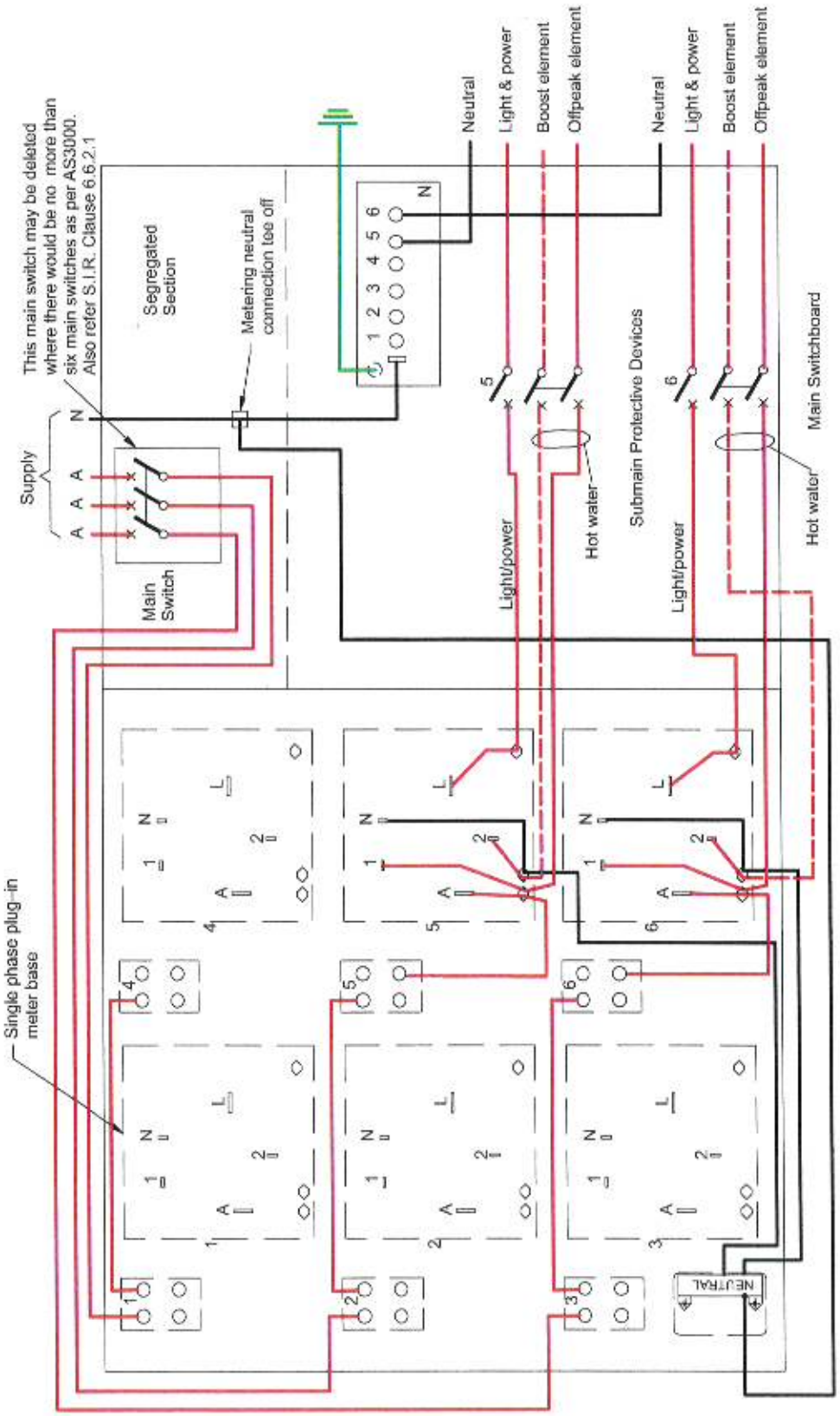


TYPICAL WIRING DIAGRAM
6 CUSTOMERS EACH SINGLE PHASE
PANEL SIZE 600mm W x 600mm H

Notes:

1. All metering neutrals minimum 2.5mm^2 stranded conductors.
2. For off peak loads refer Figures 6–6 & 6–7.
3. For simplicity wiring shown only for customers 3 & 6.
4. Refer to Table 6.1 for conductor size limitations.

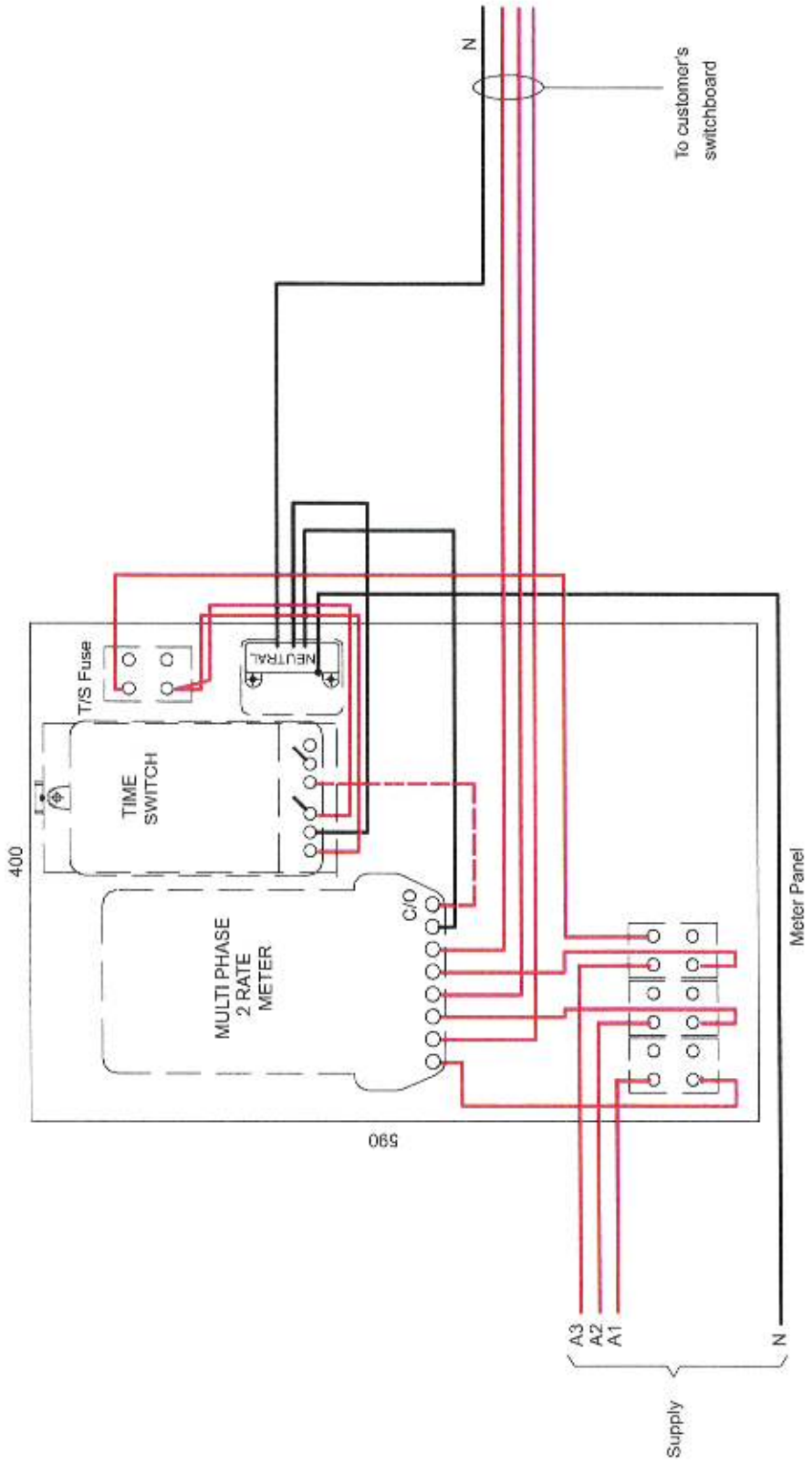
Figure 6.26



TYPICAL WIRING DIAGRAM
6 CUSTOMERS EACH SINGLE PHASE WITH TWIN ELEMENT OFFPEAK HOT WATER SERVICE WITH PLUG IN METERS.
PANEL SIZE 600mm W x 600mm H

Notes:
1. Maximum load of time switch contacts 30A.
   For switching loads exceeding 30A refer Fig 6.21.
2. All metering neutrals minimum 2.5mm^2 stranded conductors.
3. For simplicity wiring shown only for customers 5 and 6.
4. Refer to Table 6.1 for conductor size limitations.

Figure 6.27

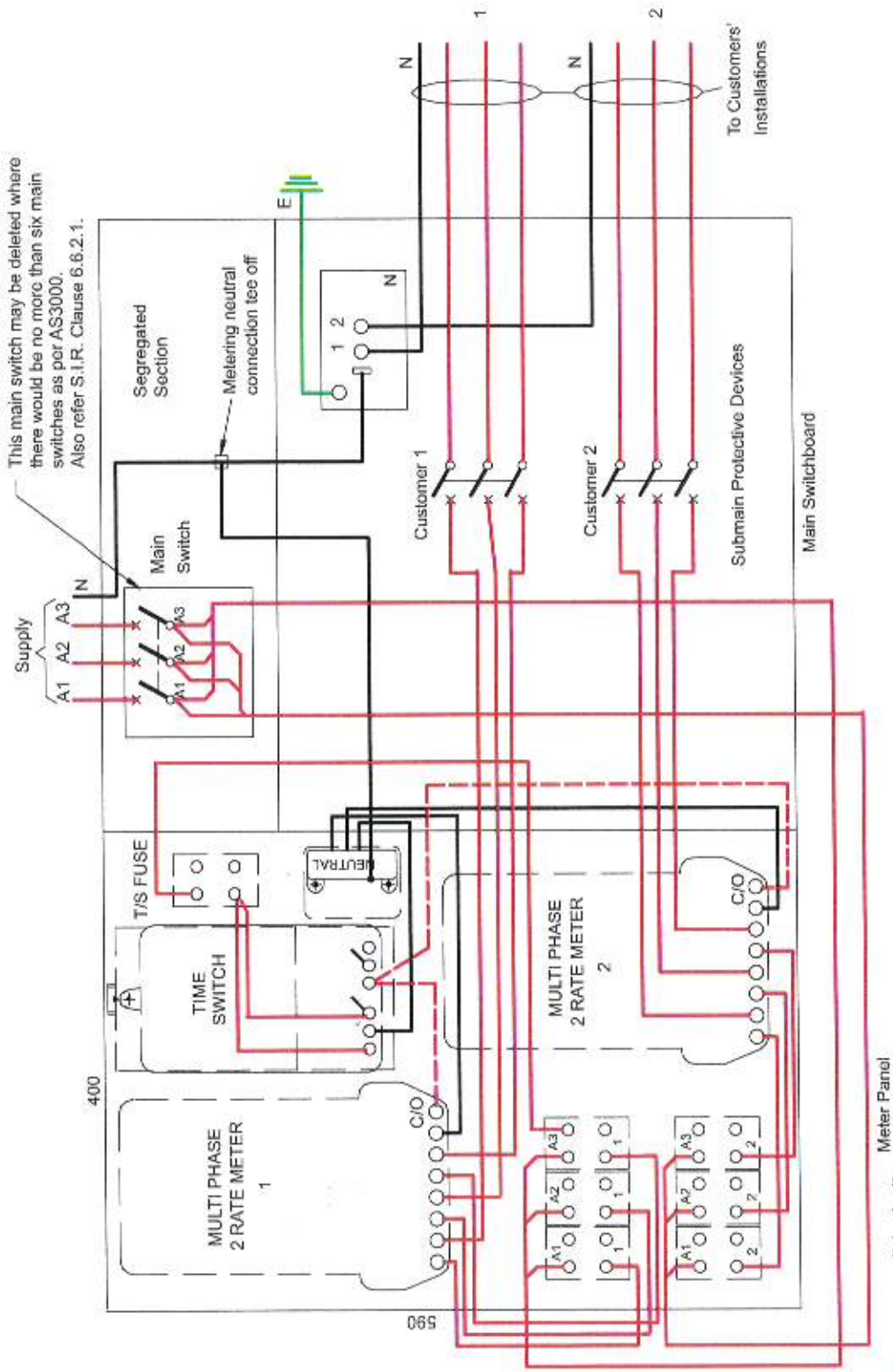


TYPICAL WIRING DIAGRAM
1 CUSTOMER MULTI PHASE FOR 1 OR 2 RATE
PANEL SIZE 400mm W x 590mm H

Notes:

1. — — — Denotes switch wire if two rate metering installed.
2. All time switch wiring and metering neutrals min. 2.5mm² stranded conductors.
3. Meter panel fuses are not required for an overhead supply.
4. If 2 rate meter is not required delete time switch, time switch fuse and associated wiring.
5. Refer to Table 6.1 for conductor size limitations.

Figure 6.28

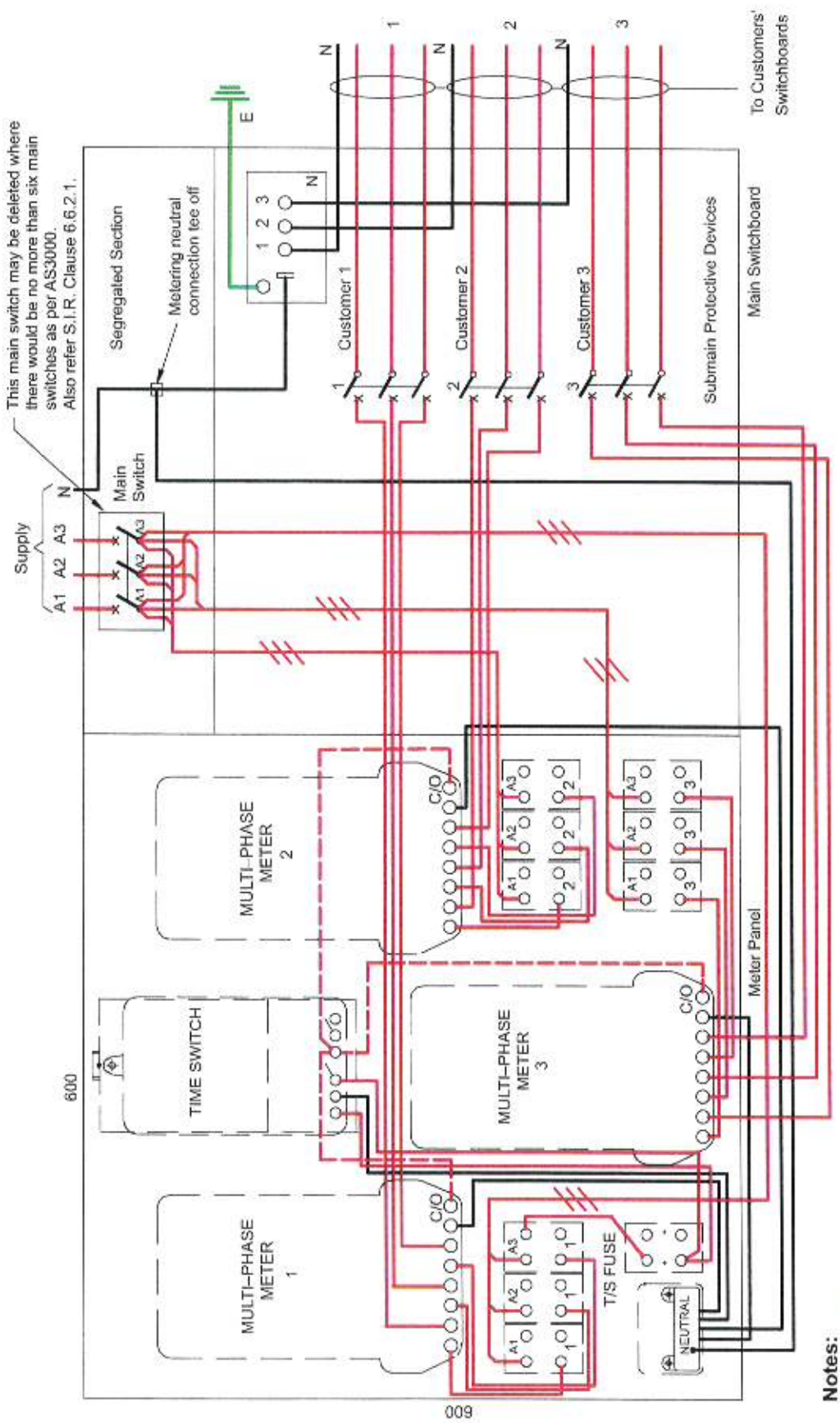


TYPICAL WIRING DIAGRAM
2 CUSTOMERS MULTIPHASE 1 OR 2 RATE
PANEL SIZE 400mm W x 590mm H

Figure 6.29

Notes:

1. — — — — Denotes switch wire if two rate metering installed.
2. If 2 rate metering is not required delete time switch, time switch fuse and associated wiring.
3. All time switch wiring and metering neutrals minimum 2.5mm^2 stranded conductors.
4. Refer to Table 6.1 for conductor size limitations.



TYPICAL WIRING DIAGRAM
3 CUSTOMERS MULTIPHASE 1 OR 2 RATE
PANEL SIZE 600mm W x 600mm H

Figure 6.30

Notes:

1. ——— Denotes switch wire if two rate metering installed.
2. If 2 rate metering is not required delete time switch, time switch fuse and associated wiring.
3. All time switch wiring and metering neutrals minimum 2.5mm^2 stranded conductors.
4. Refer to Table 6.1 for conductor size limitations.

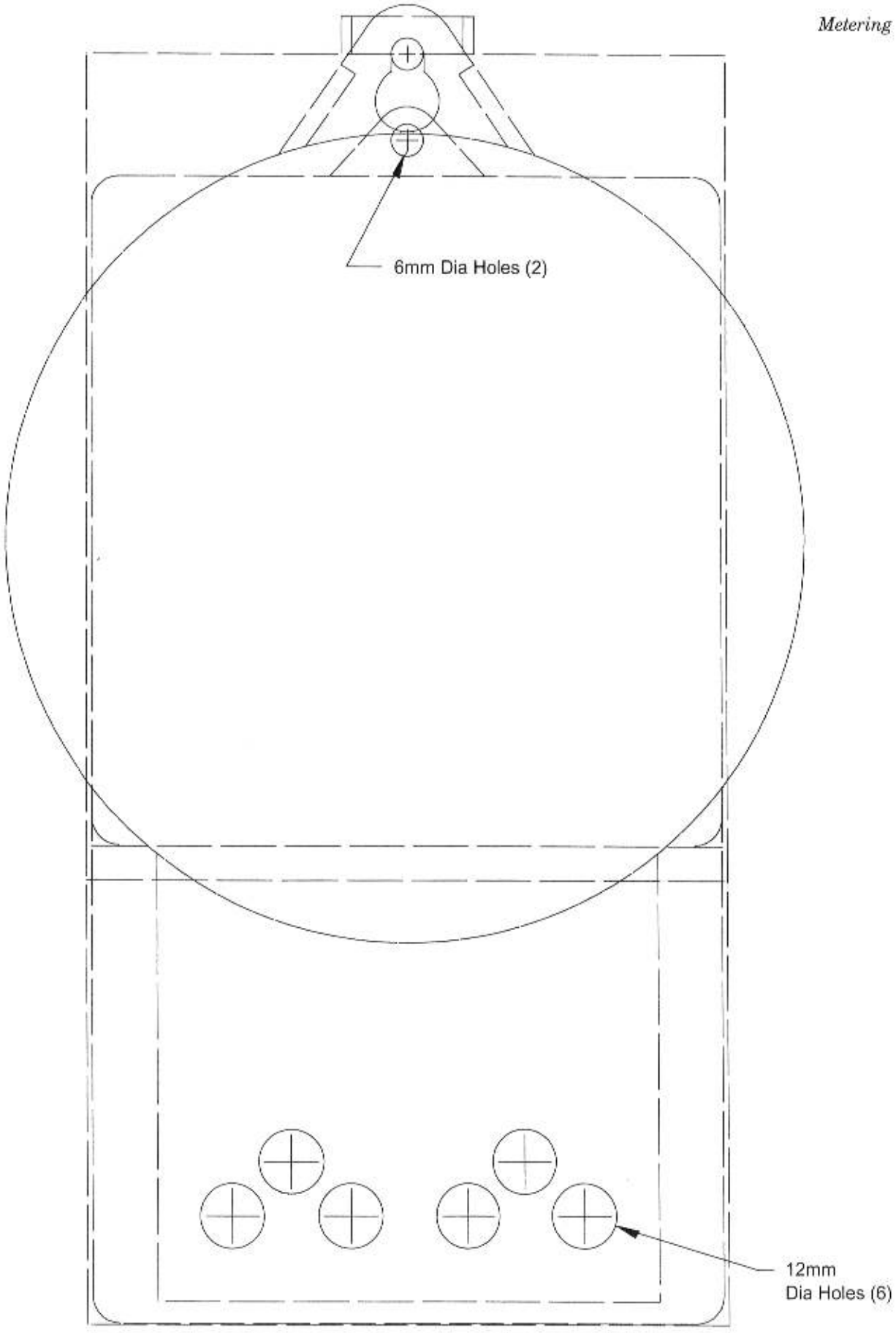


Figure 6.31 Single Phase Meter Drilling Template

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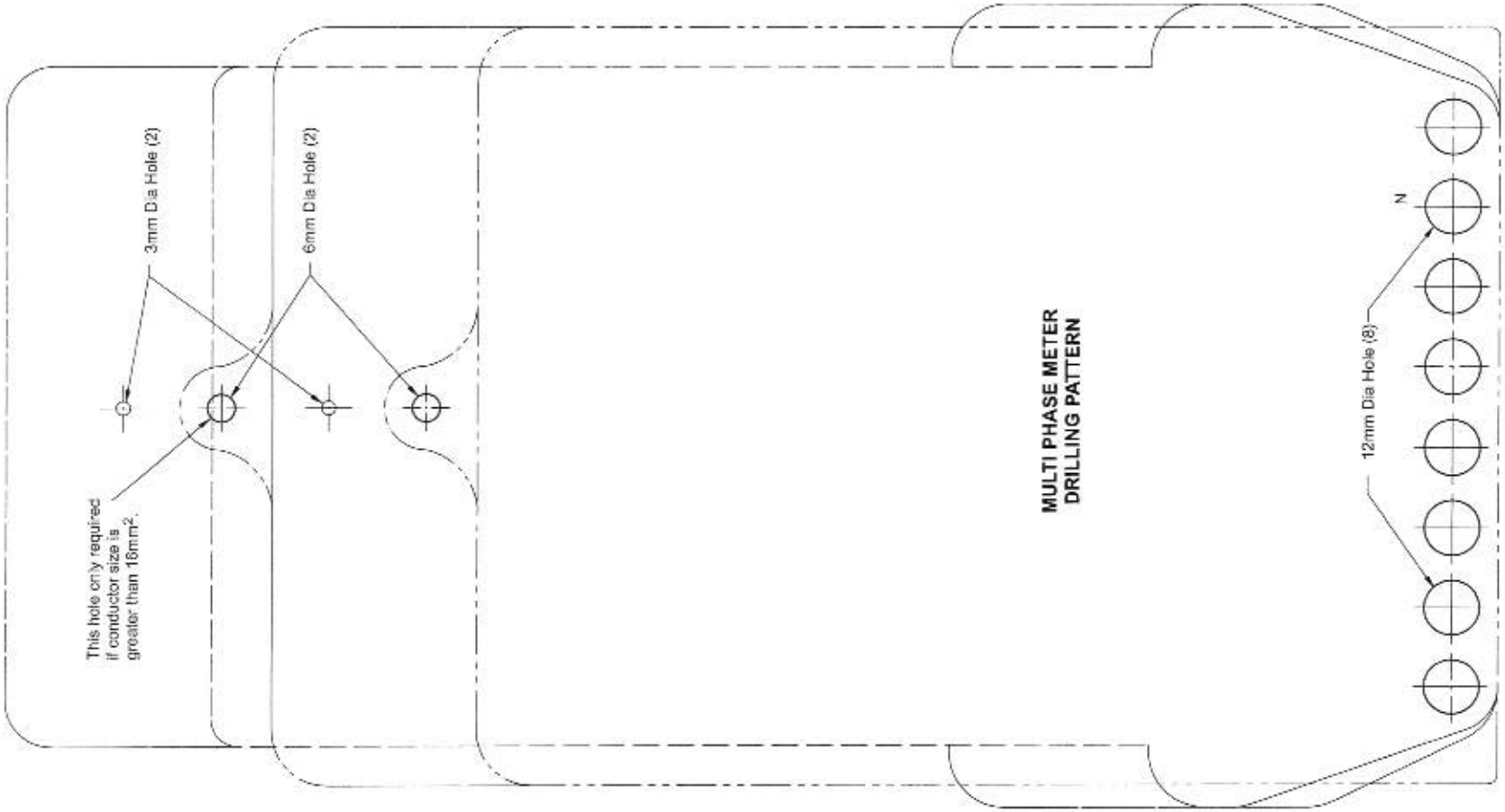

Figure 6.32 Multi Phase Meter Drilling Template

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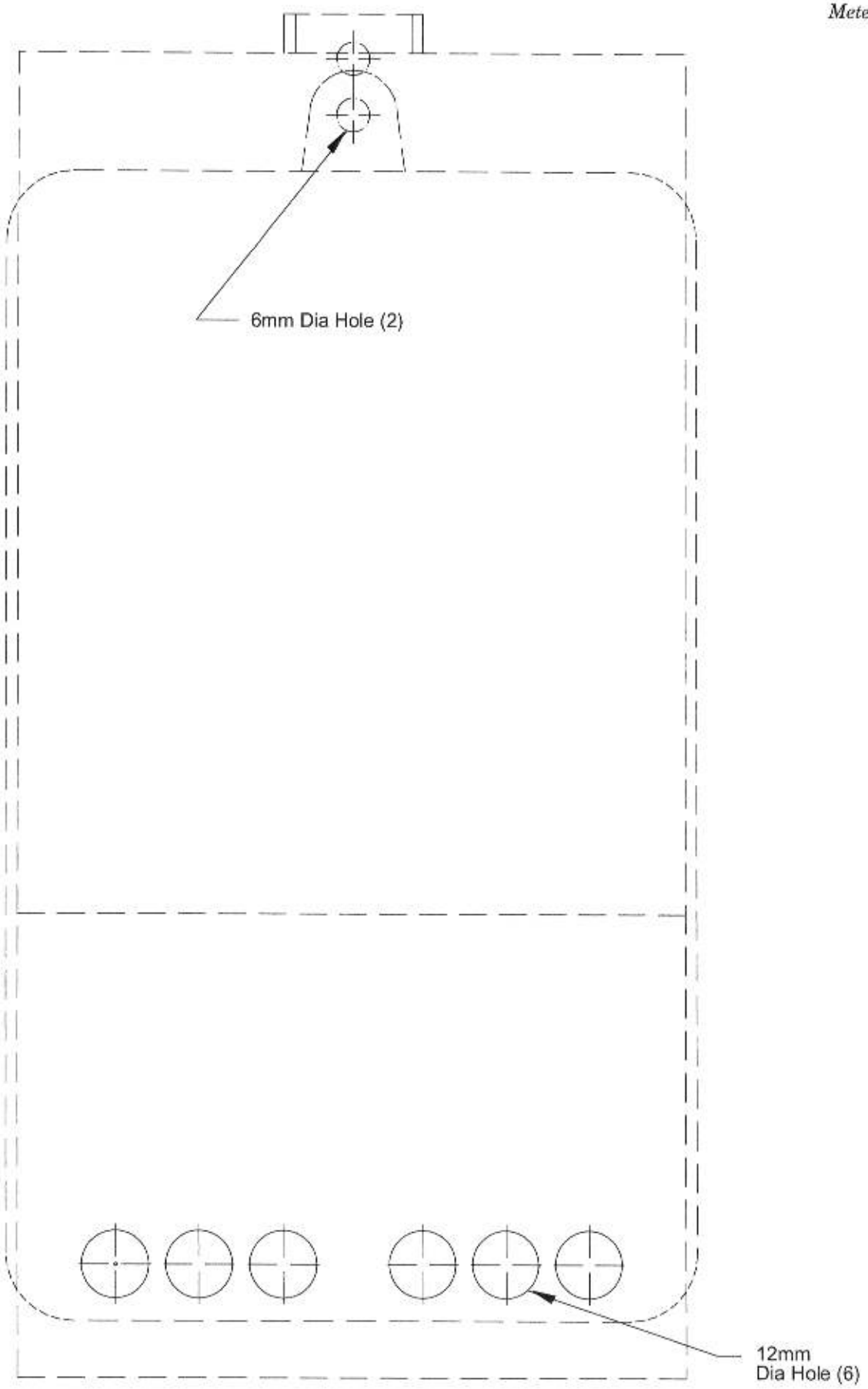

Figure 6.33 Time Switch Drilling Template

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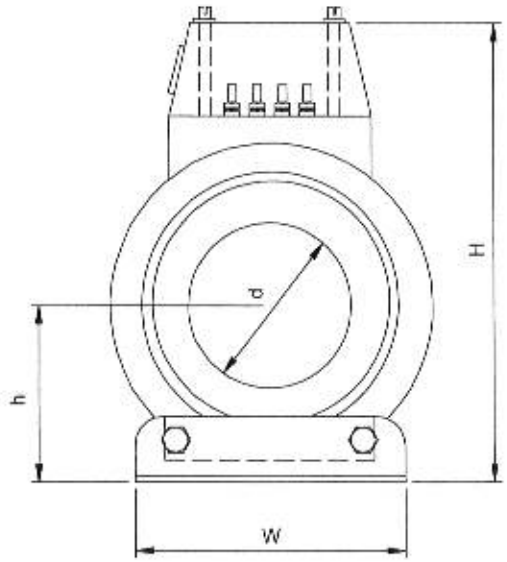
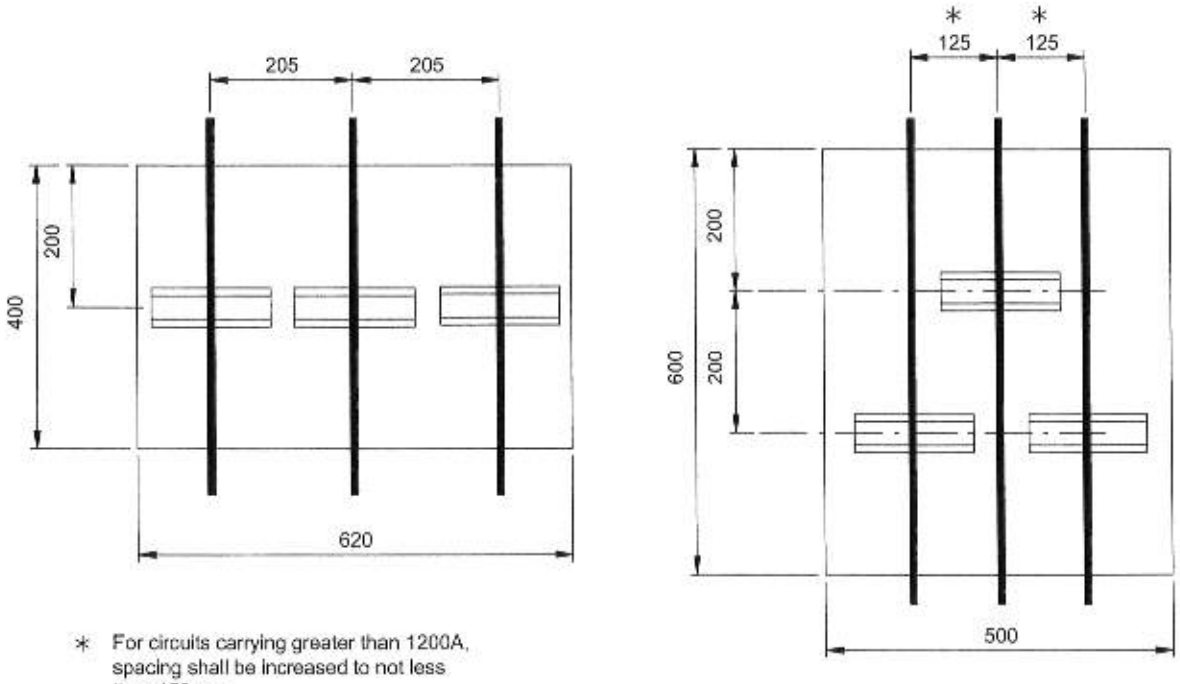


DIMENSIONS (mm)

DESIGNATION *	MAX WIDTH (W)	MIN WINDOW DIA. (d)	POSITION OF WINDOW CENTRE (h)	MAX HEIGHT (H)
S	130	45	65	165
B	165	85	85	230
C	200	112	85 or 115	270
T	167	112	95	210
W	167	85	95	210

NOTE: REFER CLAUSE 6.7.4.1

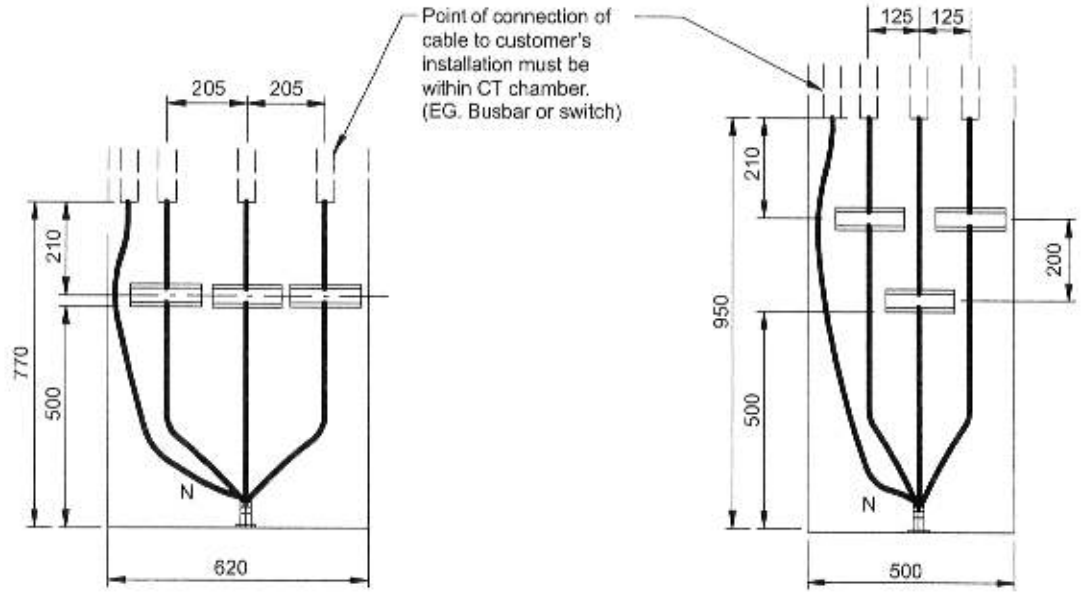
CURRENT TRANSFORMERS



* For circuits carrying greater than 1200A, spacing shall be increased to not less than 150mm.

MINIMUM SPACE IN CUBICLES FOR CURRENT TRANSFORMERS ONLY

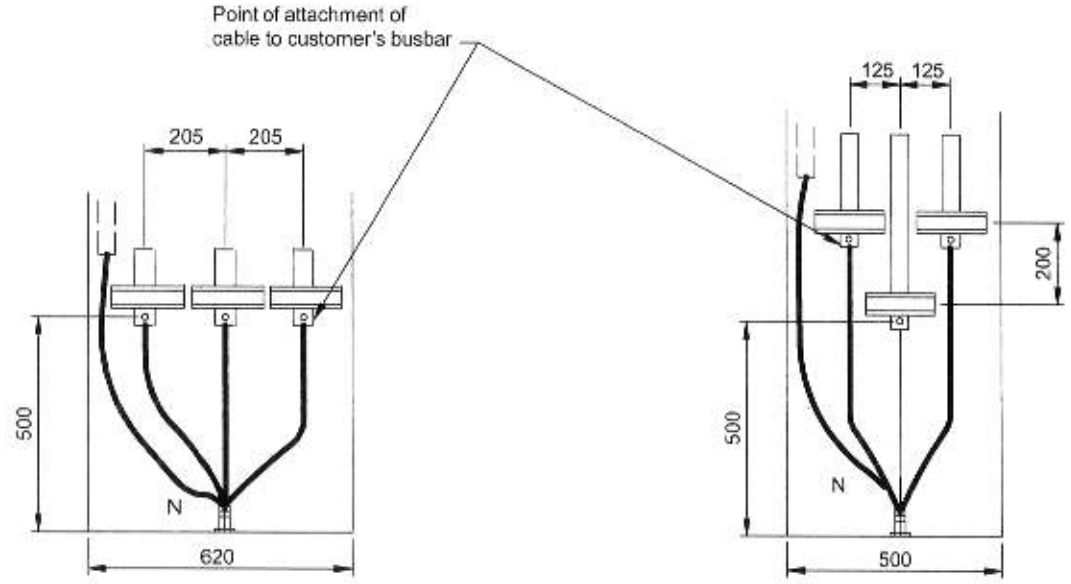
Figure 6.34 Dimensions of Current Transformers and Minimum Space Required in Enclosures for Current Transformers



Where multicore cables of 50mm^2 or less are installed 500 can be reduced to 250 and 770 to 520

Where multicore cables of 50mm^2 or less are installed 500 can be reduced to 250 and 950 to 700

SPACE REQUIRED FOR TERMINATION OF DISTRIBUTOR 185/240mm^2 UNDERGROUND SERVICE CABLES, WHERE CABLE PASSES THROUGH CURRENT TRANSFORMERS.



Where multicore cables of 50mm^2 or less are installed 500 can be reduced to 250

Where multicore cables of 50mm^2 or less are installed 500 can be reduced to 250

SPACE REQUIRED FOR TERMINATION OF DISTRIBUTOR 185/240mm^2 UNDERGROUND SERVICE CABLES, WHERE BUSBAR PASSES THROUGH CURRENT TRANSFORMERS.

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.

Figure 6.35 Minimum Space Required in Enclosures for Current Transformers and Distributor Underground Cable Terminations

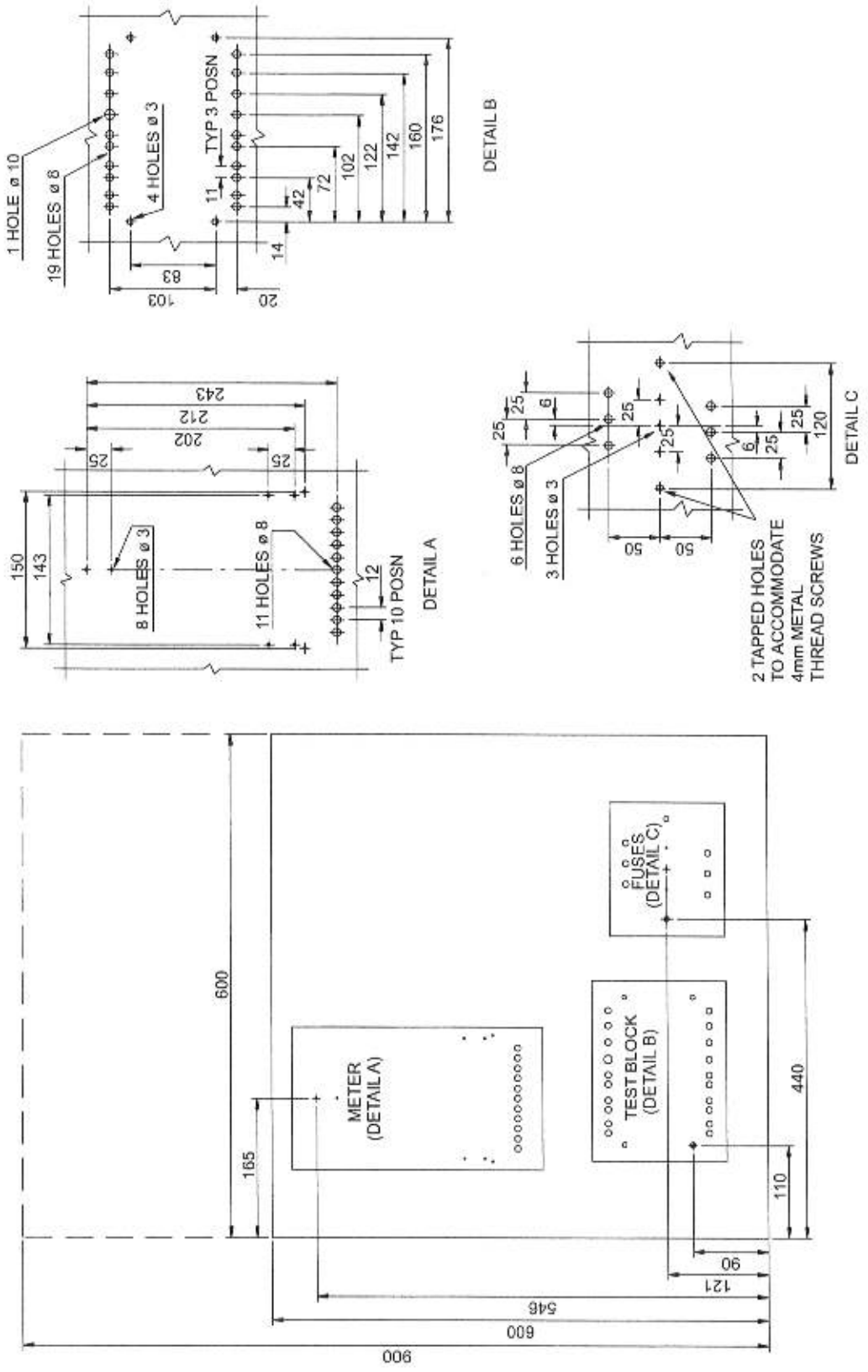


Figure 6.36 Standard Current Transformer Meter Panel Layout

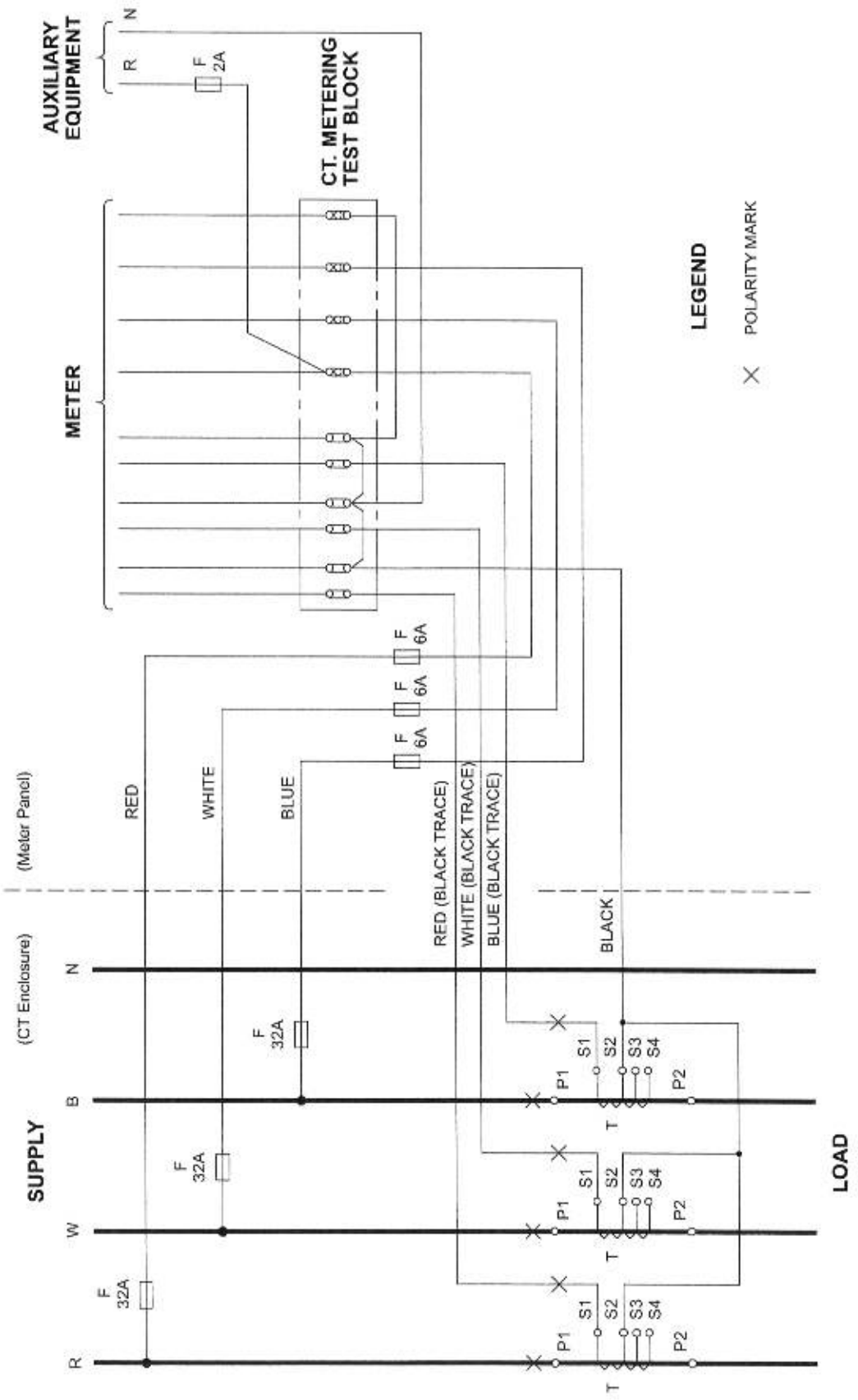


Figure 6.37 Typical Wiring Diagram for L.V. Current Transformer Metering

Multiple Occupancies

7

Section 7 Contents

Multiple Occupancies

7.1. General

A plan of the installation showing the location of the metered and unmetered mains and sub–mains in relation to the main structural features and property boundaries, 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 commencement of the installation.

7.2 Subdivisions

A copy of the proposed Plan of Subdivision shall be submitted to the Distributor at an early date.

Where lots on a subdivision do not directly abut a public road, access will be by way of common property, the extent of which will have been shown on the plan of subdivision. Such lots shall be serviced underground from the point of supply in such a way that all common mains and sub–mains are located in common property and individual mains or sub–mains supplying a given lot do not pass through other lots.

Where some of the lots on a plan of subdivision abut a public road in which the Distributor has mains, these lots may be given separate points of supply.

For subdivision of buildings, wiring passing from one premises to another shall be placed in common property or in service ducts which shall be common property.

Any switchboard associated with more than one individually metered occupancy within a multiple occupancy installation shall be installed in a common area and shall not be installed within any individual occupier's premises.

Where a multiple occupancy installation involves a subdivision of land, the common area shall be registered on the plan of subdivision as common property.

Where wiring other than wiring originating from a separate occupancy switchboard passes through that occupancy, the occupancy switchboard and wiring shall be marked as required by the Electricity Safety (Installations) Regulations.

Notes:

- **Attention is directed to Clause 6.2.4 regarding meter locations and Clause 4.4.1 regarding number of supplies.**
- **Consult the Distributor for servicing arrangements for building subdivisions and other multi–unit developments including dual occupancies.**
- **For the subdivision of existing buildings, Section 12(2) of the Subdivision Act 1988 applies where the former Notice of Installation Work (NIW) was received prior to 2nd August 1991. Where wiring passes through one occupancy to another in an implied easement, the requirements for switchboard labelling as contained in the Electricity Safety (Installations) Regulations 1999 apply.**
- **Refer to Clause 1.2 for definition of "Property".**
- **Refer to Clause 5.1.2 regarding Type of Service Cable for subdivisions.**

7.3 *Control Switch/es*

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

Clause 6.6.2.1 requires provision for individual isolation of supply to each separate meter panel.

In general, each separately metered occupancy shall be capable of individual isolation from supply by means of a Supply Disconnection Device. This requirement is varied in Clause 6.7.4.1 for particular situations involving Current Transformer metering.

Any switch installed on the line side of distributor metering equipment shall be clearly and prominently marked "TO BE OPERATED BY AUTHORISED PERSONS ONLY" and be capable of being secured in the OFF position in accordance with Clause 6.3.

Refer to Clause 6.6.4 for details of metering arrangements for multiple occupancy installations. Typical wiring diagrams and layouts are provided as figures in Section 6 – Metering.

Typical examples for grouped metering of multiple occupancies are shown in Figures 7.1, 7.2, 7.3 and 7.4.

7.4 Supply Disconnection Devices

The customer shall provide, install and maintain a Supply Disconnection Device which satisfies the relevant requirements of the appropriate Australian Standard/s and is acceptable to the Distributor (with the exception of the fuse links) located on the customer's property in a position which satisfies the Electricity Safety (Installations) Regulations.

Supply Disconnection Devices for individual occupancies within multiple occupancy premises shall be located so as to allow access as specified in Clause 5.2.3 and in addition be located in a common use area where access is available to all occupiers of the building or the occupier supplied through the device.

Any such device shall be of a type specified in Clause 5.2.2 and be selected with regard to the following:

- The operating environment.
- The ability to be manually operated by hand or, in the case of aerial lines, by means of a standard operating stick from ground level.
- Facilities for sealing or locking by the Distributor as required by these Rules.

Supply Disconnection Devices shall conform with the requirements of Clauses 5.2.2, 6.3 and 6.6.2.1 of these Rules and with the relevant requirements of the appropriate Australian Standard.

7.5 Labelling

7.5.1 Labelling of Premises

Where premises are divided into separate occupancies and a separately metered supply is given to occupiers of individual rooms, suites of rooms, flats, units, shops, factories, etc, an identification number or letter or combination of both shall be assigned and marked at the main entrance of each occupancy.

Where the occupancy consists of a number of separate areas or street addresses, each shall be marked or some other approved system of identification shall be adopted.

7.5.2 Labelling of Switchboard, Meter Panel and Wiring

A durable marking corresponding with the label required by Clause 7.5.1, shall be placed on the distribution board and at the meter position for each occupancy to identify the supply equipment to that portion of the premises.

All meter panels shall be permanently labelled to indicate the relationship between meters, fuses and other equipment as described above. Such labelling shall remain clearly visible after installation of all equipment.

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.

7.5.3 Multiple Supplies

Where in accordance with Clause 4.4, premises are supplied from more than one service, labels shall be provided at each set of Consumer's Terminals and at the main switchboard associated therewith, indicating the portion of the installation supplied.

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

7.6 Metering in Multiple Occupancies

Where Distributor metering is to be installed in group locations in multiple occupancies, the metering shall be located in a common area or common property which is accessible to all occupants. This arrangement shall be to the satisfaction of the Responsible Officer. Refer to Section 6 for metering arrangements.

7.7 URD Areas of Supply

In URD areas of supply, the sheathing (double insulation) of Consumer's Mains shall be maintained for the entire length of cable up to the terminal of the first Service Protection Device in accordance with Clauses 5.4.3.8(b) & 5.4.3.3(c).

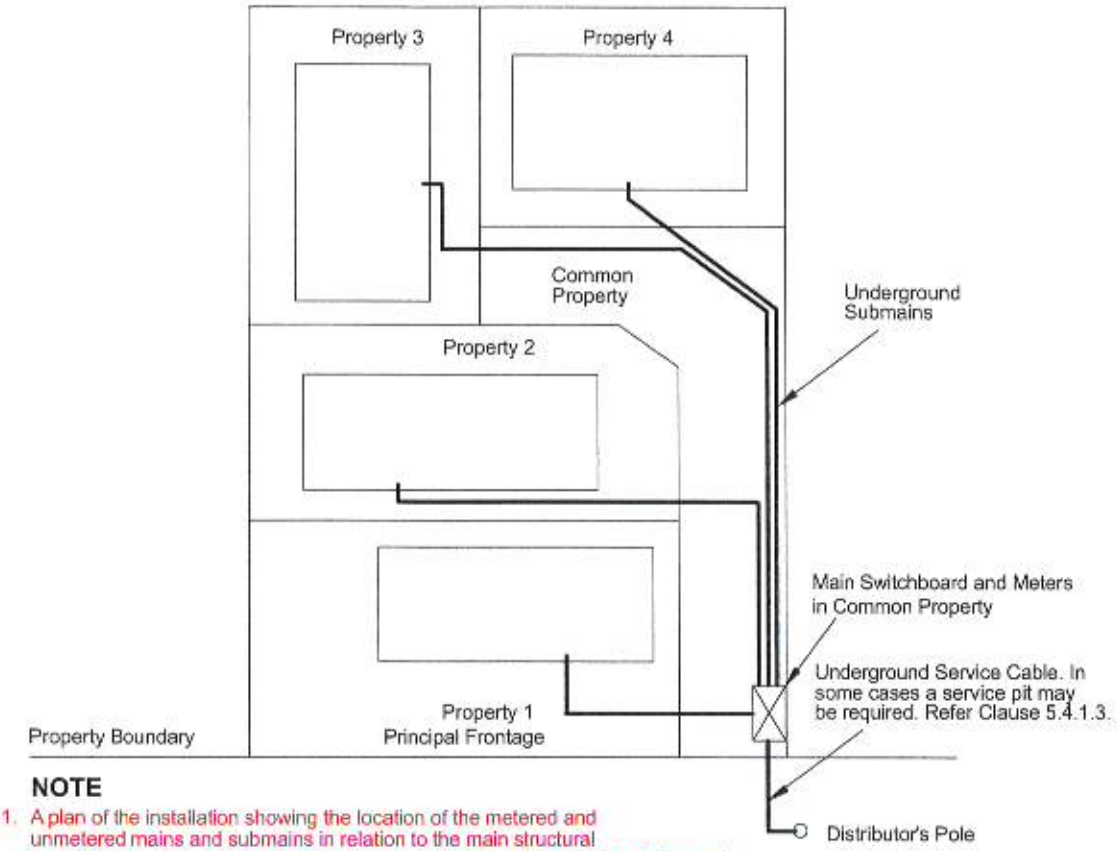
The Service Protection Device shall be installed as required by Clause 5.2.2.

7.8 Earthing of Multiple Occupancy Installations

In multiple occupancy installations, the MEN connection to the incoming neutral conductor shall be located in a position that is common to all separately metered occupants associated with that connection.

In addition, the MEN connection shall be effected at the point where the main incoming neutral conductor is terminated within the main switchboard, other than on or behind a meter panel.

MAIN SWITCHBOARD AND METERS IN COMMON PROPERTY



NOTE

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 commencement of the installation.
2. In URD areas the Distributor may require a Service Protection Device/s to be installed in the consumers mains.

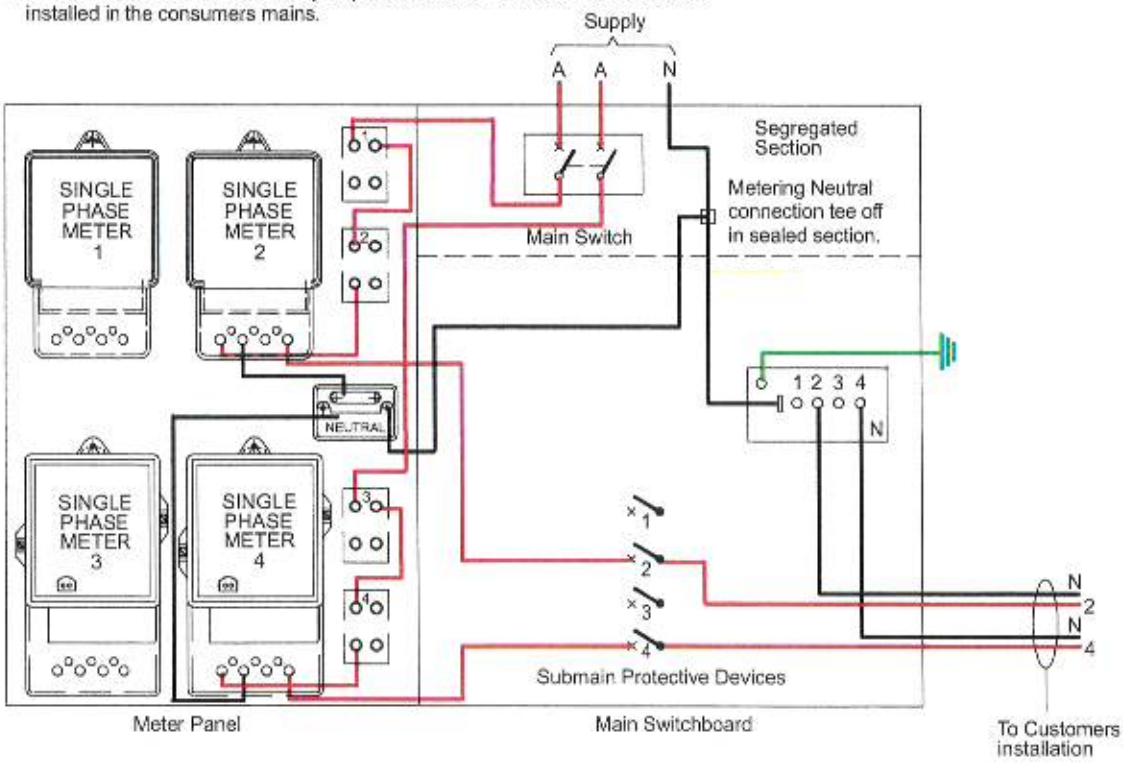
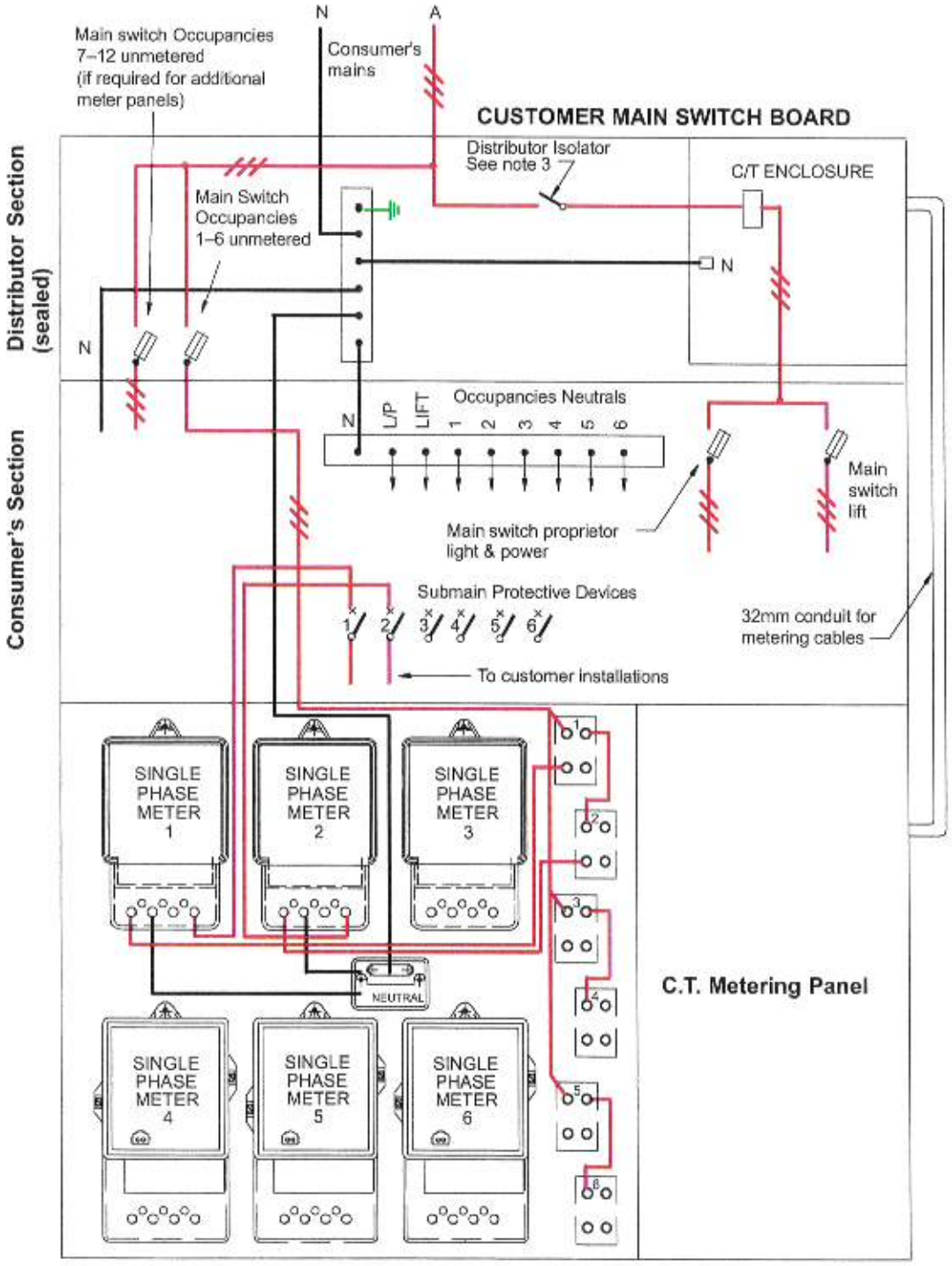


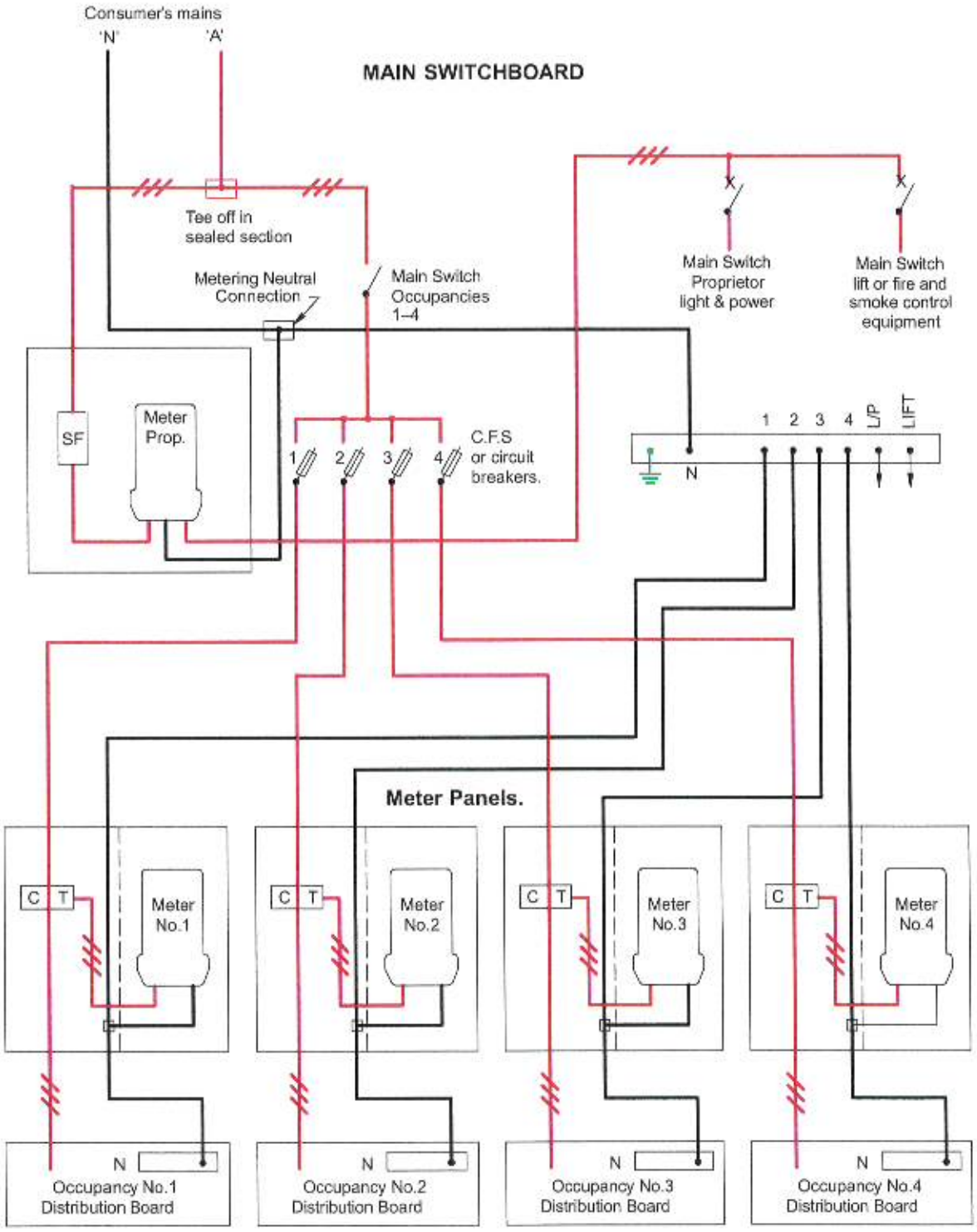
Figure 7.1 Typical Arrangement Diagram for Separately Metered Occupancies



NOTES

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. Refer to Fig.6.26.
3. Attention to AS3000 regarding switches controlling essential services. Refer to Clause 6.7.4.1 of these Rules.

Figure 7.2 Typical Wiring Diagram for Separately Metered Occupancies Including CT Metering for Proprietor



NOTES

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.

Figure 7.3 Typical Wiring Diagram for Four CT Metered Occupancies and Proprietor with Direct Connected Metering

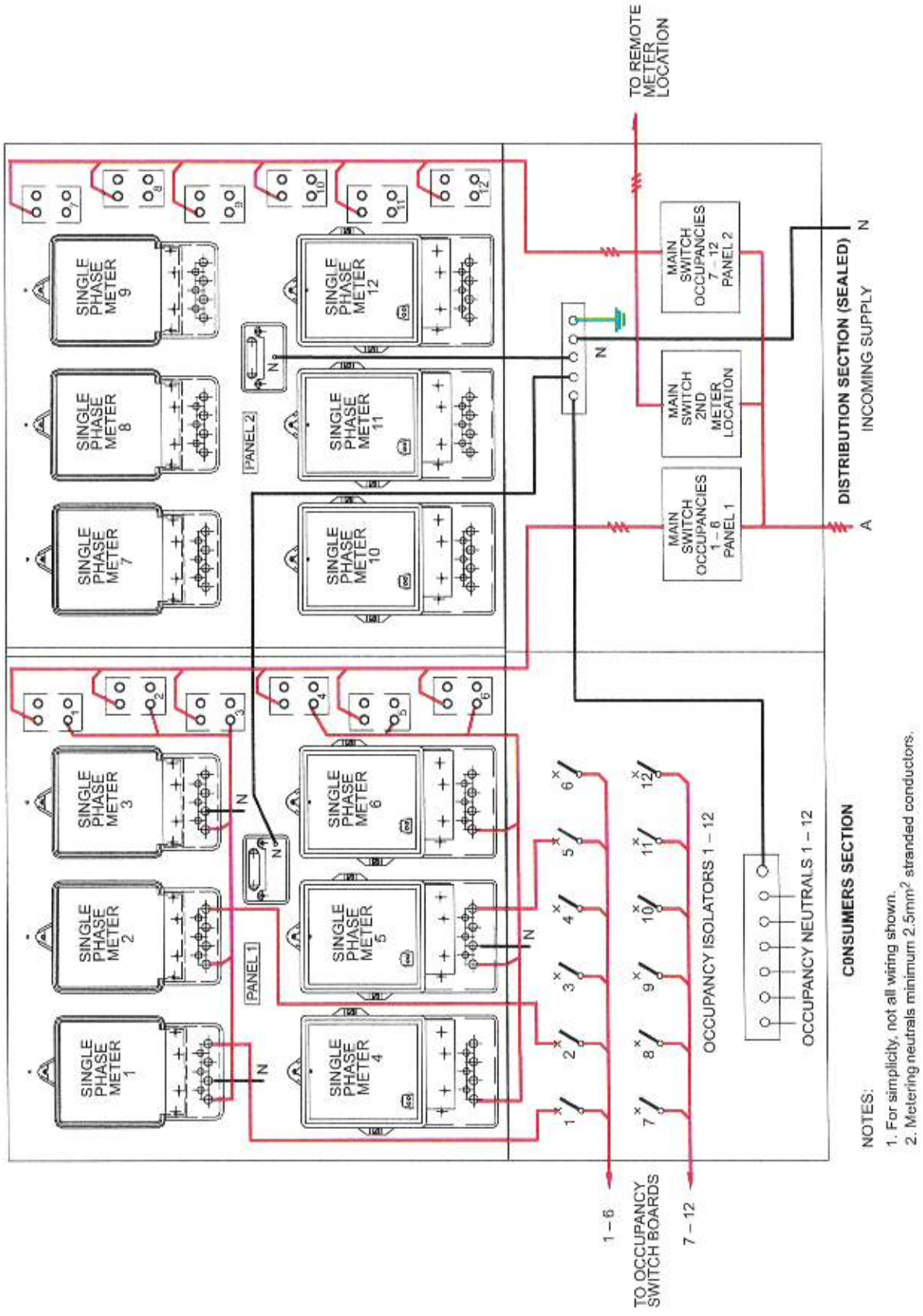


Figure 7.4 Typical Arrangement of Main Switchboard and Metering for 12 Occupancies

High Voltage Installations

8

Section 8 Contents

Section 8 Contents

High Voltage Installations

8.1 Introduction

This Section details the requirements of a Distributor for Customers taking supply at high voltage, up to and including 22 kV, from the Distributor's supply system.

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 (Installations) Regulations (mainly set out in Section 8 of AS 3000) and apply to both new installations, and alterations or extensions to existing Customer installations.

Customers should consider supply at high voltage when their load exceeds 1 MW and is likely to grow or a tariff comparison reveals that their load pattern would be better suited to a high voltage tariff.

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.

Please note that this Section does not cover the requirements for supply at 66 kV or higher voltages.

8.2 Electricity Supply Contract

A Customer requiring a supply of electricity at high voltage shall be required to enter into an Electricity Supply Contract which shall specify the terms and conditions which relate to the provision and operation of such supply.

Similarly, Customers who require only partial supply from the Distributor or who wish to operate private generating equipment in parallel with the Distributor's supply system shall also be required to enter into an Electricity Supply Contract.

8.3 Systems of Supply

The Distributor will determine 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.

In general, one of the following nominal supply voltages would be made available :–

- 6.6 kV
- 11 kV; or
- 22 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).

8.4 Approval of Designs and Equipment

The earliest possible notice (preferably twelve months) should be given of the intention to plan for a high voltage supply.

Ensuing discussions would facilitate determination of the merits or otherwise of supply at high voltage. These discussions 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.

The equipment shall have suitable ratings and performance parameters for connection to the supply system as detailed in this Section.

All plant and equipment shall comply with the relevant Australian Standards, 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
- High Voltage Motors — AS 1329
- Generators — AS 1359
- Current Transformers — AS 1675
- Voltage Transformers — AS 1243
- Protection Relays — AS 2481 or IEC 255 as appropriate
- High Voltage Fuses — AS 1033 or IEC 282

The Customer shall submit the following detailed drawings for written approval prior to entering a commitment to commence installation works :–

- single line diagram showing the general arrangement of substations and other high voltage equipment;
- proposed earthing arrangement;
- schematic diagrams for control wiring, tripping supplies and protection circuits;
- protection schedule and relay settings, including protection CT performance details;
- labelling schedule;
- details of overhead line design;
- maintenance schedule;
- underground cable design; and
- site plan and plan/elevation of switchrooms/substations including major high voltage plant items.

These drawings should be submitted at the earliest possible date. Failure to submit the above drawings 20 working days prior to commencing installation works, or drawings that do not conform to the agreed parameters, could result in delays to the proposed commissioning date.

The following information, including type test certificates where appropriate, shall be provided at the earliest possible time.

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.

Transformers

- manufacturer;
- rated voltages and tapping range;
- rating (kVA);
- lightning impulse withstand level;
- vector group symbol;
- insulating medium; and
- type of connections.

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.

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.

Generators

- manufacturer;
- type of generator;
- rated output;
- rated voltage;
- rated current;
- synchronous, transient and sub transient reactances. (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.

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
  – time-current characteristic.
- Battery and battery charger details.

8.5 General Design

8.5.1 Circuit Connections

The normal supply arrangement is via a single Distributor high voltage feeder, however arrangements can usually be made for a second high voltage feeder where required.

Paralleling of the Distributor's high voltage feeders is normally not permitted, however paralleling may be permitted subject to the conditions as detailed in Clause 8.5.4

8.5.2 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. The clearances as detailed in Table 8.1 shall be maintained at all times.

Table 8.1 Impulse Withstand Voltages & Clearances in Air of Switchgear Assemblies. (Based on Table 9.1, AS 2067)

Rated Voltage kV rms	Rated Lightning Impulse Withstand Voltage kV Peak (see Note 1)	Minimum Phase – Earth Clearance mm (see Notes 2 & 3)	Minimum Phase – Phase Clearance mm (see Notes 2 & 3)
Up to 3.6	40	60	70
7.2	60	90	105
12	75	120	140
24	125	220	225

Notes to Table 8.1 :

- Insulation co–ordination is required to ensure that the surge diverters installed provide adequate protection for equipment.
- Clearances less than those shown in columns 3 and 4 will be considered subject to the presentation of a test certificate.
- It is desirable to increase the phase to earth clearances where the presence of birds or vermin could cause a hazard, or for construction reasons.

8.5.3 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:

- 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 durations at any particular location on the Distributor's high voltage system will be made available upon request.

8.5.4 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 shall be readily accessible to authorised persons and shall be 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.

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.

8.6 Metering

The following high voltage metering requirements are applicable to single feeder high voltage installations (up to 22 kV) and comply with the Wholesale Metering Code and Retail Tariff Metering Code (as appropriate). Dual high voltage feeders and co-generation installations will require additional provisions.

8.6.1 General Requirements

Metering equipment shall be located at a position determined and approved by the Distributor.

- A clear, illuminated, paved and level space as specified in Clause 6.2.1, shall be provided in front of the metering position to allow access for meter reading and to accommodate test personnel and their equipment.
- 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 6.2.1.1
- Metering equipment must not be subjected to industrial contamination, extremes in temperature, or vandalism. The minimum enclosure requirement is IP 23 to AS 1939.
- Unless enclosed in an independent enclosure having no projections, open, live or bulky apparatus is not permitted below the meter panel. Any controls, push buttons, etc., should be enclosed. The Distributor will not accept responsibility for inadvertent operation of any unprotected apparatus located below or in front of the meter panel.

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 8.2 and 8.5).

A suitable earth grid is required for all wall mounted metering installations. The Distributor will, in consultation with the Customer, specify the earthing requirements. The specifications contained in Figure 8.2, concerning the earthing grid, are to be treated as minimum requirements.

8.6.2 Metering Requirements (Single Feeder)

8.6.2.1 Meters Mounted on an Interior Wall

The customer shall provide a suitable enclosure or surround for mounting a lift–off hinged panel to mount the metering equipment. For details see Figures 6.4 and 6.5.

A clear wall space of 2.0 m high by 1.2 m wide is required for the mounting of metering equipment. See Clause 6.2.1.

8.6.2.2 Meters Contained in a Wall Mounted Cubicle

The minimum size meter panel for cubicle mounting is:–

- Height 900 mm
- Width 600 mm

The enclosure door must be side hinged, and have either lift–off hinges, or be fitted with a stay, to retain it in an open position. The door shall be labelled **"Electricity Meters"**.

Meter boxes shall comply with Figure 6.5. A specification is available from the Distributor to meet the above requirements.

8.6.2.3 Meter Panels Supplied by the Customer

Meter panels shall comply with the requirements of Clause 6.5.1.

The Distributor will normally provide and install the wiring for the meter panel.

8.6.2.4 Meters Housed Outdoors (ie. in vicinity of Outdoor C.T.'s & V.T.'s.)

Metering equipment shall be enclosed in a cubicle complying with the requirements of Clauses 8.6.3 and 6.5.1

The Specifications for the supporting structure and foundations for this cubicle, are shown in Figure 8.1. The Customer shall supply and install the cubicle, foundations and supporting structure to these specifications.

Where there are no made roads to within 10 metres of the meter position, there shall be at the very minimum, a formed all–weather roadway for vehicles, from the nearest made roadway to the meter position.

8.6.3 Metering Transformers

8.6.3.1 Overhead Supply

Metering transformers shall be mounted on a pole structure to Distributor standards. These transformers are of an oil–filled variety, which combine both current transformers (CTs) and voltage transformers (VTs), and will be mounted in a manner shown by Figure 8.2.

Secondary wiring and associated conduits located on the high voltage metering structure/pole shall be installed by the Distributor. Protective conduits for secondary wiring from the high voltage structure/pole to the metering structure shall also be installed by the Distributor.

8.6.3.2 Underground Supply

(a) Metering Transformers Located Outdoors

As an alternative to mounting metering transformers on a high voltage pole structure, metering transformers may be enclosed within a cubicle meeting the specifications of Figure 8.4. This cubicle will be mounted on a concrete pad, which shall be supplied by the Customer, meeting the specification in Figures 8.3.

(b) Metering Transformers Located Indoors

Where metering transformers are located indoors and enclosed in a cage or cubicle, the requirements of Clause 8.6.3.3 shall apply in addition to the following.

The transformer enclosure shall be to the satisfaction of the Distributor. A cubicle shall comply with, and meet at least the minimum space requirements as shown in Figure 8.4.

The Customer shall provide protective conduits for the secondary wiring, from the transformer enclosure to the metering position. Secondary wiring will be provided by the Distributor, but should be installed by the Customer in those conduits prior to the conduits being permanently fixed in position.

The layout of the transformer will be such that identification of transformer polarities can be readily established, and that there is ready access to the secondary terminals of all transformers.

The enclosure shall also contain a suitable earthing bar between the CTs and VTs, so as 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.

8.6.3.3 Metering Transformers Mounted in Switchgear

(a) General Requirements

Metering transformers mounted within the Customer's high voltage switchgear shall only be acceptable following approval from the Distributor.

The following requirements must be met when metering transformers are mounted in high voltage switchgear:–

- The transformers must be mounted within a chamber which is able to be placed under Distributor seals. The chamber design must be approved by the Responsible Officer prior to purchase and construction.
- No other devices apart from metering equipment shall be located within the chamber.
- The voltage transformers will be permanently mounted within the metering chamber.
- The secondary terminals of the transformer must be easily accessible.
- Where the meter panel is remote from the metering transformers, provision must be made for protection of the secondary windings of the voltage transformers. The fuses must be placed in an accessible position where an access permit would not be required. The fuses would normally be 10 Ampere rated, HRC.
- Where fuses are placed on the secondary windings of the voltage transformers, provision must be made to place the fuses under Distributor seal.
- The white phase secondary winding of the voltage transformer, which is earthed, must not be fused.
- Provision for Customer switching or isolation prior to the metering transformers is not permitted.
- It should be noted that secondary wiring from the transformer to the meter position will be hard wired; that is, no breaks or links will be allowed between the transformers and the meter position.
- Provision will also be made within the transformer chamber for bonding primary conductors to earth, should the need arise to disconnect the supply and carry out work on the metering transformers.
- It is not Distributor policy to install primary voltage transformer fuses, however if the Customer chooses to install them they must be Distributor approved. Spare fuses must be readily available and kept in a mutually acceptable location.
- If the metering transformers are supplied by the Customer and they are not able to be directly replaced by Distributor spares, then the Customer shall be required to purchase suitable spares and have them available on site.

(b) Metering Transformers Supplied by the Customer

Where metering transformers are provided by a Customer the following requirements must be met :–

- The current and voltage transformers shall be completely encapsulated with the secondary terminal box part of the resin body of the transformer.
- The 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 performances shown in Table 8.2.

Table 8.2 Performance requirements for metering transformers

Description	Distributor 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)

- The transformers shall be solely for Distributor metering purposes and their installation shall be subject to approval.
- Test certificates from a NATA registered laboratory or a previously approved equivalent laboratory shall be provided prior to installation. The certificates shall be written in English.

Minimum information to be included on the test certificate is :–

- The test certificate shall show conclusive evidence that the transformers comply with the relevant Australian Standard specification.
- 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.

(c) Metering Transformers Supplied by the Distributor

Supply of metering transformers by the Distributor for installation in Customer's high voltage switchgear is the preferred option. There are many benefits in using Distributor supplied metering transformers, they include:–

- Guaranteed Distributor approval of metering transformers.
- Availability of Distributor spares, which otherwise would need to be carried by the Customer.

8.6.4 Customer's Maximum Demand Control Equipment

If a Customer wishes to monitor and control energy management equipment, energy and time impulses are available on request from the Distributor. The cost of this will be in addition to other costs incurred. Pulses will not be supplied to installations supplied under energy–only tariffs. The form of pulses provided will be at the discretion of the Distributor. The Distributor will bear no liability under any circumstances for possible malfunctions of the pulsing equipment.

Energy and time synchronisation pulses will be supplied from Distributor metering, via an interposing relay to the Customer. The contact rating of these relays and the form of the outputs can be obtained from the Distributor.

The energy pulses will be via a 3 wire, form C, and the time synchronisation via a 2 wire system, with the choice of normally open or closed contacts. Further options, such as transducer outputs for load control are able to be engineered and offered to suit specific customer requirements.

8.7 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. Customers shall discuss the protection requirements with the Distributor prior to detailed design work and placing orders for equipment.

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.

All switch fuses shall be fitted with simultaneous overcurrent operation of all three phases.

It is preferred that current transformers for overcurrent protection be located on the supply side of the circuit breaker.

Protection settings and equipment shall be subject to the approval of the Distributor prior to commissioning. Any modification of the settings shall be subject to the approval of the Distributor.

In general the Customer's primary phase fault protective devices for faults at the voltage level of the supply shall have an operating time of not greater than 150 milliseconds. Any proposed operating time greater than 150 milliseconds shall be discussed with the Distributor at an early stage.

8.8 Interference to the Distributor Supply System

The Customer shall ensure that the high voltage installation complies with the requirements of the Distribution Code, which details the acceptable levels of load generated interference.

8.9 Installation of Conductors

8.9.1 Underground Cables

The high voltage underground cables shall be installed in accordance with both the Electricity Safety (Installations) Regulations and the Electricity Safety (Network Assets) Regulations.

After installation and before activation, the cables shall be tested in accordance with the relevant Australian Standards.

In accordance with the Electricity Safety (Installations) Regulations a detailed drawing recording the route, depth of laying and other relevant information shall be produced by the customer. This drawing shall be available for the use of all persons concerned with future ground openings on the property.

8.9.2 Overhead Lines

Overhead lines shall be designed and constructed in accordance with the Electricity Safety (Network Assets) Regulations and the Distributor's Overhead Line Design Manual and shall be approved by the Distributor prior to construction.

Unless otherwise set out in the Wiring Rules, current ratings of aerial conductors shall be determined in accordance with Electricity Supply Association of Australia Limited (ESAA) Document D(b)5 - 1987. If adequate information is not available, current ratings determined from assumed operating conditions shall be subject to the approval of the Distributor.

8.9.3 Substations

All apparatus shall be clearly and uniquely labelled to ensure correct identification by operating and maintenance personnel.

It is recommended that consideration be given to the provision of suitable safety clearances and earthing points to allow safe access for maintenance and inspection without the need to de-energise the entire installation.

8.10 Earthing

8.10.1 General

The earthing system of the Customer's high voltage installation shall comply with AS 3000 Section 8.

The following Clauses are set out to clarify the Distributor's requirements.

8.10.2 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. A guide to the application of the combined earthing system is shown in Figure 8.6.

This system of earthing requires that at least two separate and distinct groups of electrodes shall be connected to the common terminal bar, so that any connection may be removed for testing without interference to others.

The use of underground water piping as an earth electrode is not acceptable.

The combined earthing system shall have a resistance to earth not greater than 1 ohm and may be achieved by connections to electrode systems, metallic cable sheaths or low voltage neutrals, provided that when any such connection is removed, the resistance of the remaining earth connections does not exceed 30 ohms.

Each substation on the Customer's property shall have its own independent earthing system. Where there are multiple substations on the Customer's property it may be necessary that the earthing systems be connected together by a conductor of the same size as the high voltage earthing conductors.

Earthed primary neutral windings are not permitted on any transformer of the voltage at which the Customer takes supply. It is recommended that the Customer use Delta–Star transformers to comply with this requirement.

The transformer tank, sheaths of any high voltage underground cables, and all accessible metallic parts containing or supporting high voltage conductors and all parts metallically connected thereto shall be bonded to the common terminal bar.

The star point of the distribution transformer low voltage windings, sheaths of any low voltage underground cables and all accessible metallic parts containing or supporting low voltage conductors, and all metallic parts connected thereto shall be bonded to the common terminal bar.

8.10.3 Separate Earthing System

If the requirements of the combined earthing system cannot be met, then a separate earthing system shall be installed in accordance with the relevant clauses of Section 8 in AS 3000, following approval from the Distributor.

8.10.4 Size of Earthing Conductors

All conductors used within the combined or separate earthing systems referred to above shall have a minimum equivalent copper cross–sectional area as follows :–

- High voltage earthing conductors: 22 kV – 70 mm^2, 11 kV – 95 mm^2;
- Low voltage earthing conductors : 120 mm^2;

and shall have a cross sectional area not smaller than the size calculated on the nomogram "Fault Level and Duration for Stranded Aluminium and Copper Non–Tensioned Earthing Conductors" in Table 8.1 of AS 3000.

8.10.5 Other Earthing Requirements

All metallic substation fences, doors or enclosures shall be connected to the earthing system and a grading ring shall be installed around the substation enclosure in accordance with AS 2067.

Reinforcing in the substation floor or walls shall be connected to the common terminal bar.

8.11 Conversion from Low Voltage to High Voltage

In order to take supply at high voltage, it will normally be necessary to transfer ownership of high voltage assets. It may also be necessary to modify existing assets to comply with the

Electricity Safety (Installations) Regulations. These issues will form part of negotiations for such a transfer.

8.12 Testing and Commissioning

Routine test reports on all high voltage electrical equipment shall be submitted to the Distributor for approval prior to activation.

The high voltage equipment shall be tested on site in accordance with the requirements of AS 3000 (the Wiring Rules) and other relevant Australian Standards as deemed necessary by the Distributor. These tests shall be performed by a competent testing organisation. The certified results of these pre–commissioning tests shall be made available to the Distributor before the high voltage equipment is energised.

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 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.

8.13 Operation and Maintenance of Customer's High Voltage Installation

8.13.1 Operating Procedures

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 may need to provide to the Distributor a copy of the Customer's high voltage operating procedures, prepared in accordance with the "Blue Book".

8.13.2 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.

High Voltage apparatus such as operating sticks, safety earths, gloves and insulating mats shall be made available by the Customer in accordance with the Customer's high voltage operating procedure.

8.13.3 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 will be required to provide a written maintenance proposal before supply is made available, and verification of this proposal may be requested by the Distributor.

Adequate spare high voltage fuses of the required size and rating shall be available on site at all times. It is recommended that consideration be given to the provision of spare critical high voltage items of equipment.

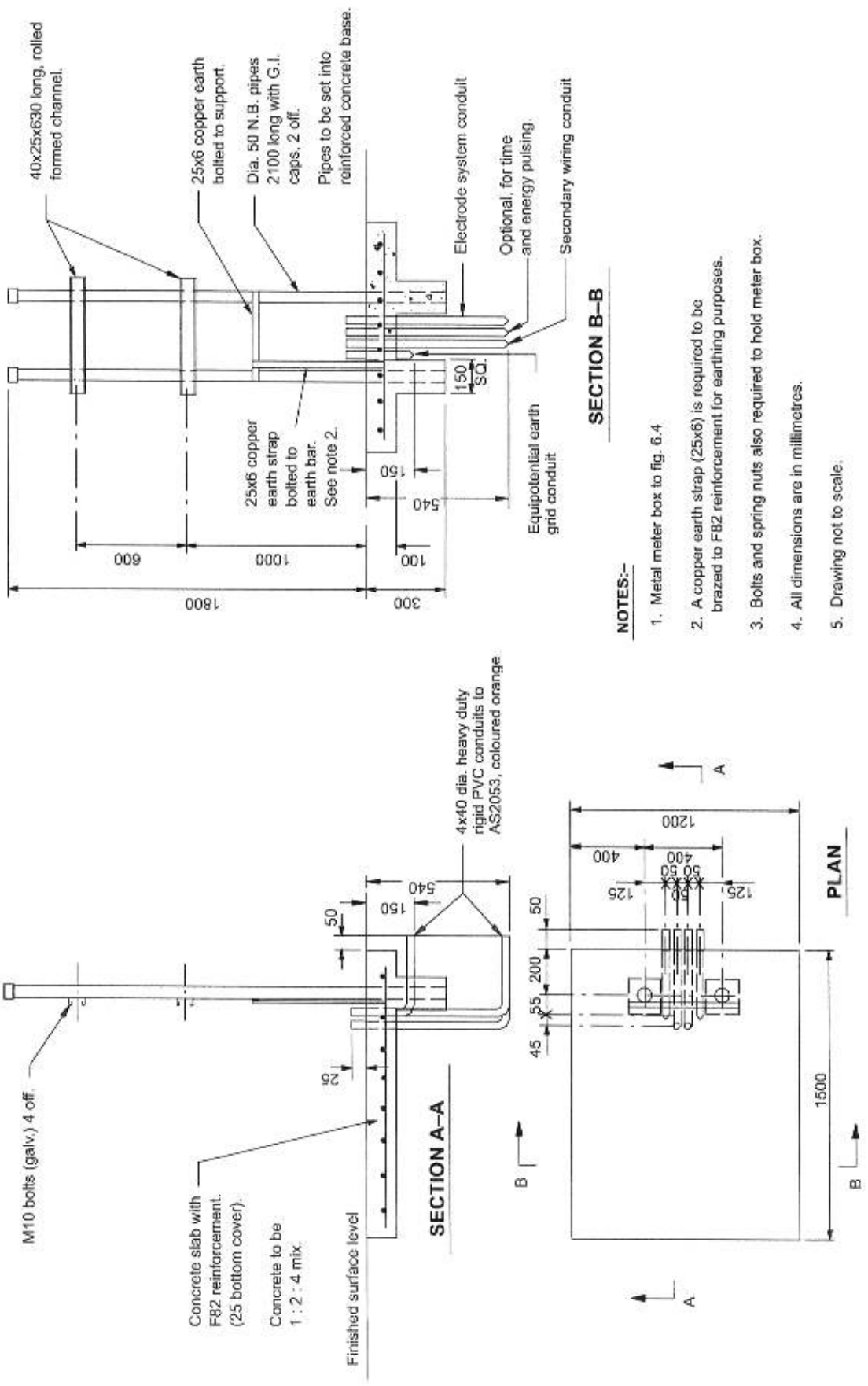


Figure 8.1 H.V. Metering Structure – Foundation and Support Details for Meter Box

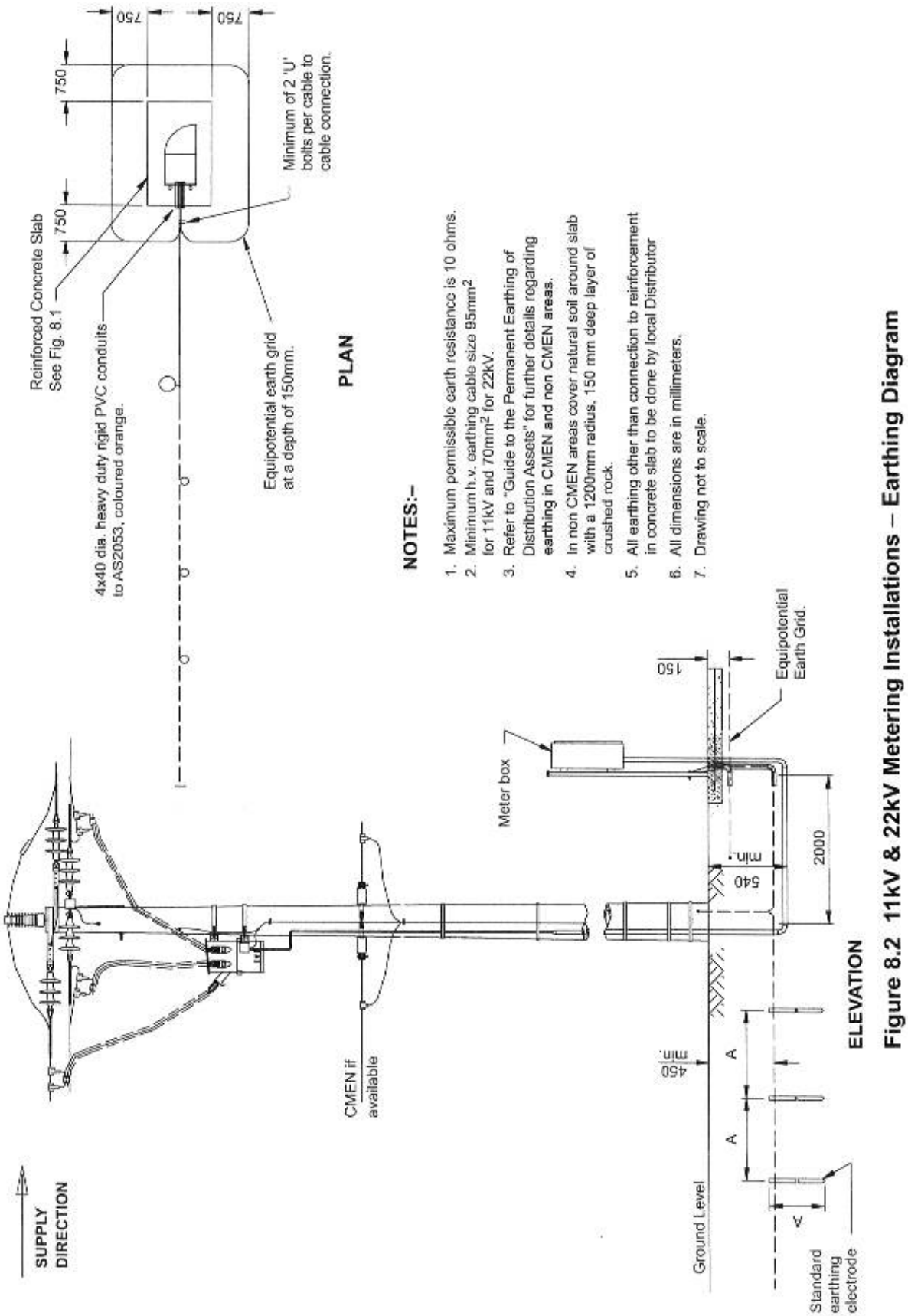
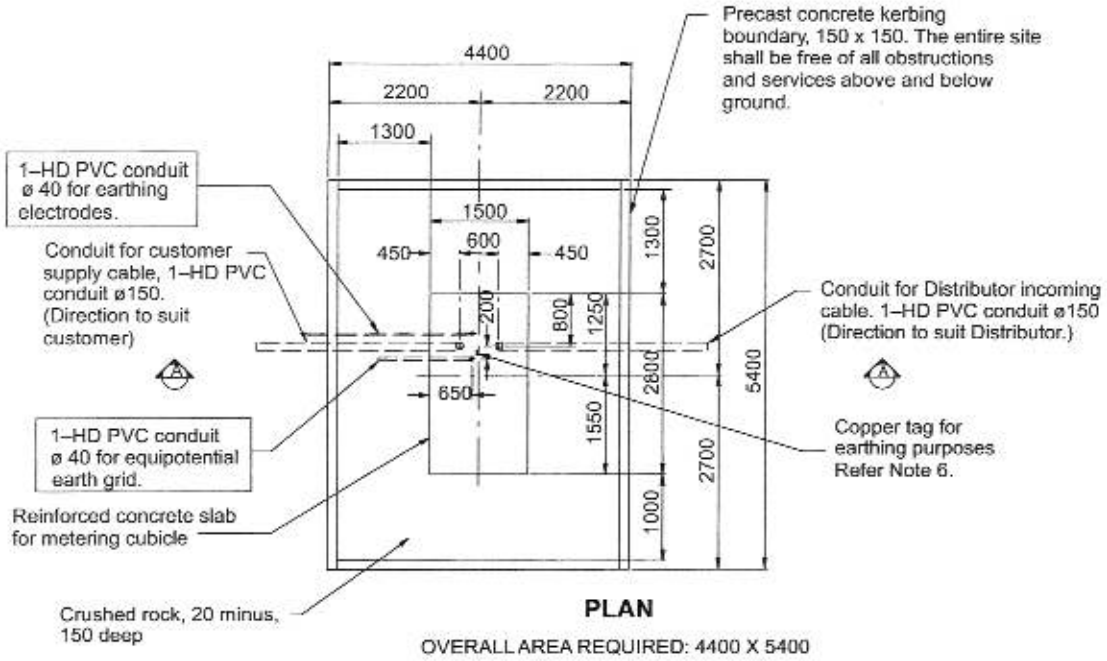
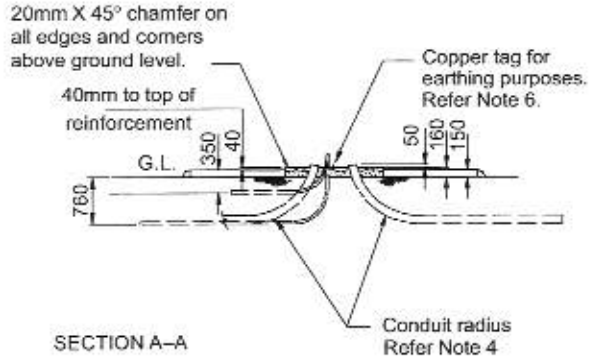


Figure 8.2 11kV & 22kV Metering Installations – Earthing Diagram





NOTES :–

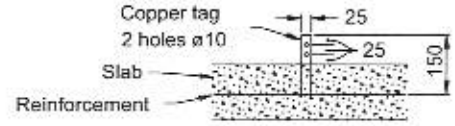
1. Concrete shall be graded 25MPa, and nominal slump shall not exceed 75mm. Concrete to have a hard surface, levelled and trowelled smooth. A suitable slope is required to ensure water run off.
2. Steel reinforcement shall comply with S.A.A. codes as follows: F81 wire fabric – to AS1304 S12 plain bars – grade 230S to AS1302 Reinforcement to have 50mm cover to all formwork & 40mm cover to top of footing.
3. Crushed rock under footings shall be compacted by three passes (minimum) of a wacker or other approved mechanical means.

4(a). Conduits for cables :– Heavy duty rigid PVC ø150mm to AS2053, coloured orange. Conduits to have 1020mm minimum radius bend where required, and terminate 50mm above slab level. Depth to invert level of conduits – 760mm min.

4(b). Conduits for earthing :– Heavy duty rigid PVC ø40mm to AS2053, coloured orange. Conduits to have 300mm minimum radius bend where required, and terminate 50mm above slab level.

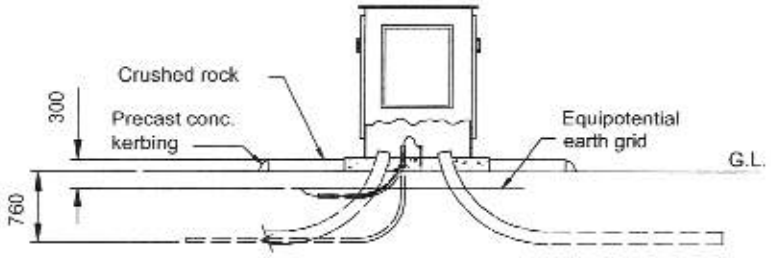
4(c). All conduits fitted with removable plug in each end and all joints must be free of internal projections. Conduits to be inspected by Distributor prior to backfilling. Two clear days notice is required.

5. Site to be suitably drained to the satisfaction of the Distributor.
6. A copper tag (25x6x150) shall be brazed to the reinforcement for earthing requirements. Tag as per the following detail:

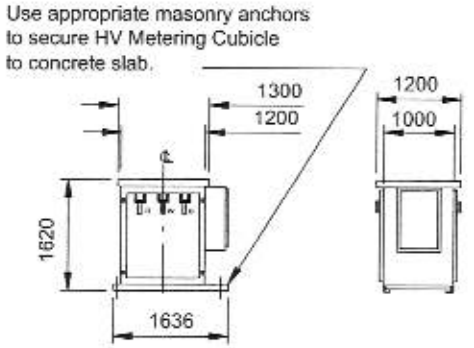


7. All dimensions are in millimetres.
8. Drawing not to scale.

Figure 8.3 Standard HV Metering Cubicle – Foundation Details



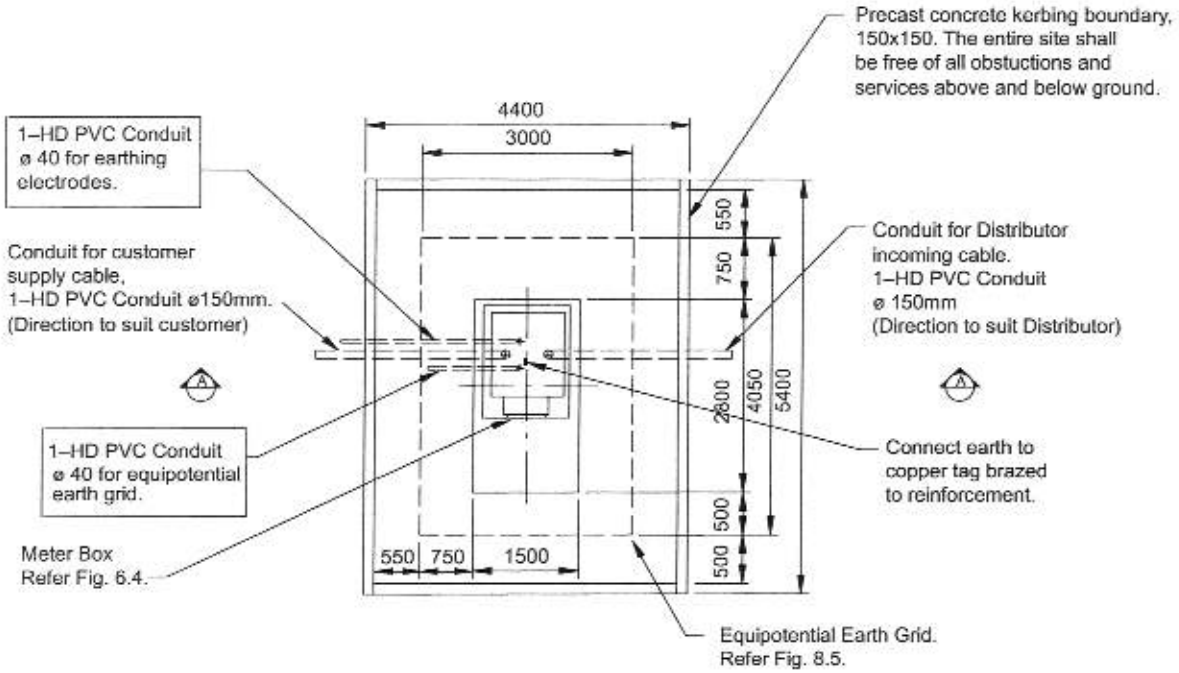
SECTION A–A



FRONT VIEW **SIDE VIEW**

(DOORS REMOVED)

HV METERING CUBICLE



NOTES :–

1. The contractor shall complete all works neccessary for the Distributor to install and connect cables and cable terminations to the point of supply.
2. Braided copper conductor is to be used to earth the two cubicle doors to the earth bar.
3. In CMEN areas, the crushed rock and precast concrete kerbing may be omitted.
4. All dimensions are in millimetres.
5. Drawing not to scale.

Figure 8.4 Standard HV Metering Cubicle – General Arrangemet

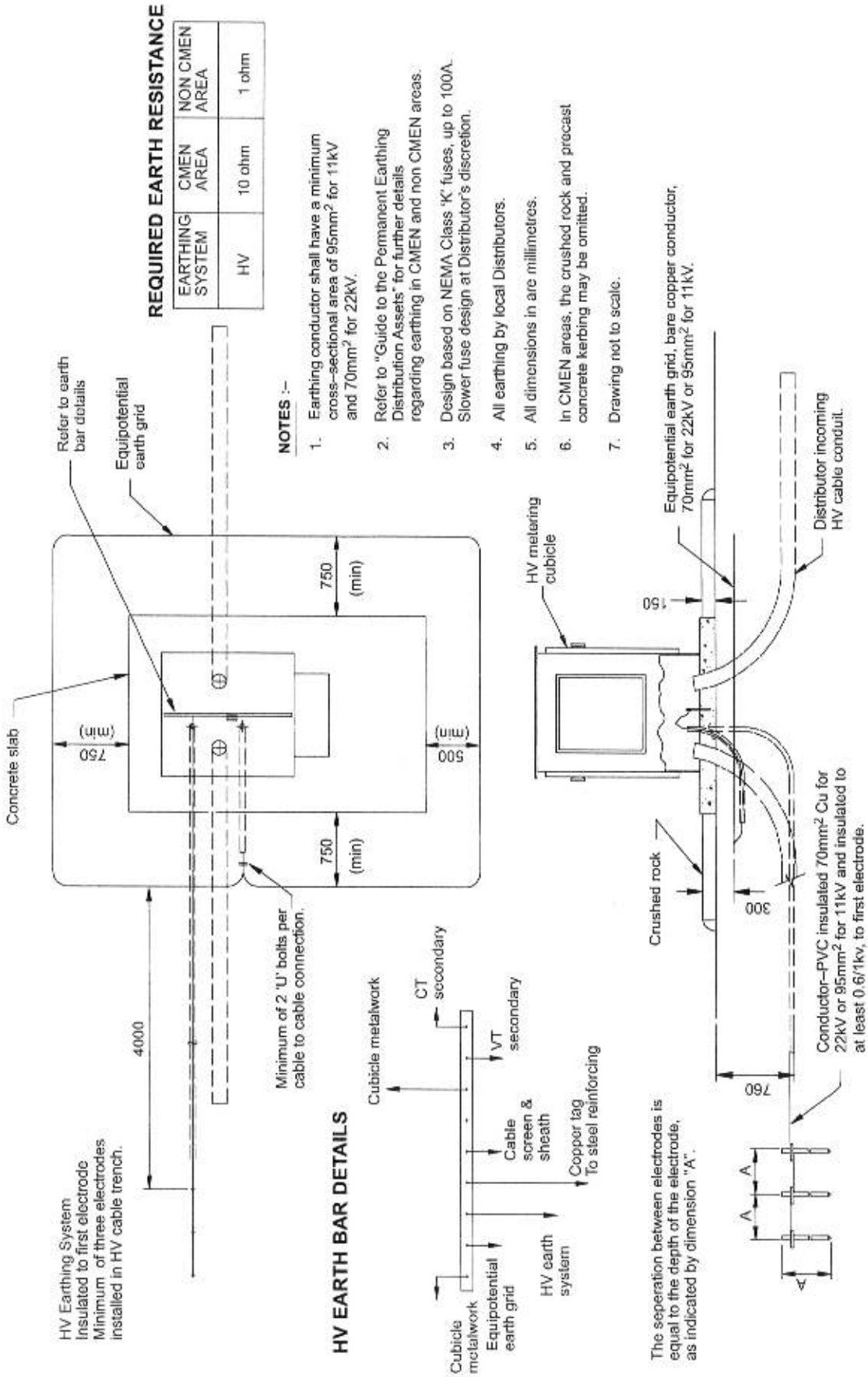
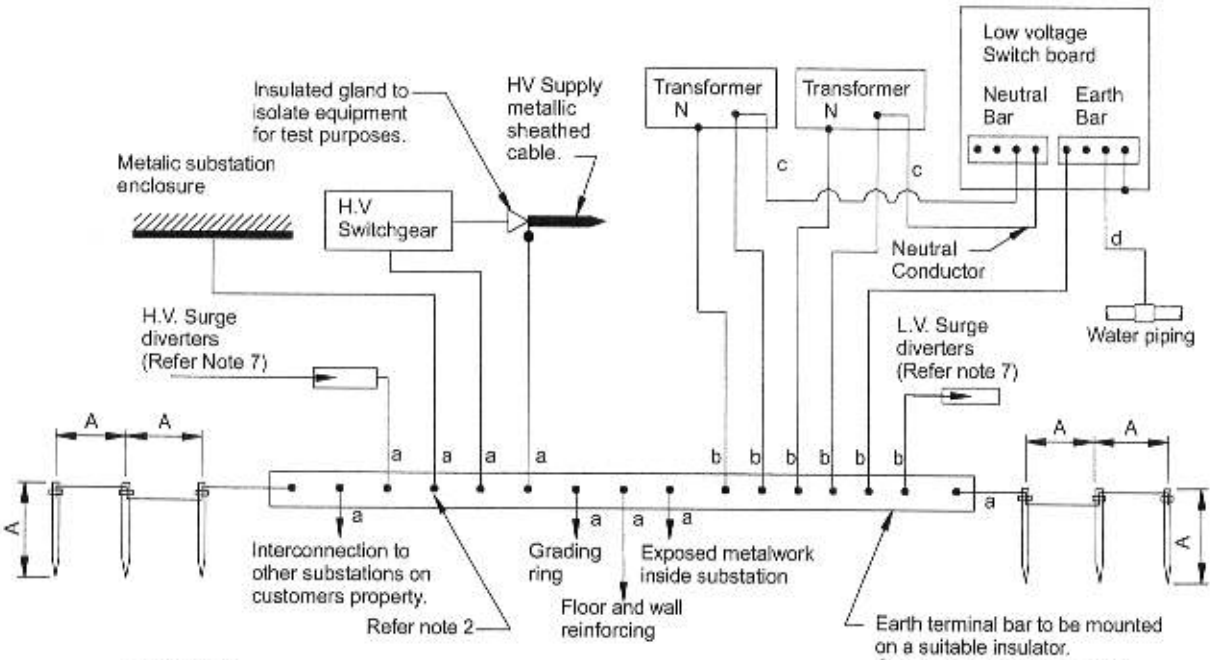


Figure 8.5 Earthing Diagram – Standard HV Metering Cubicle



NOTES :–

1. These requirements are based on the SAA Wiring Rules AS3000 and clause and table referred to below are in AS3000.
2. Connect to the terminal bar a separate conductor for each item and label accordingly.
3. H.V. conductors are to be kept on one side of the terminal bar and L.V. conductors on the other side.
4. The two separate earth electrode systems shall each comprise a minimum of 3–1500mm long copper clad earth electrodes. The preferred minimum spacing between eletrodes– Dimension "A" shall be equal to the length of the electrodes. The preferred minimum spacing between the two earth electrode systems shall be 5 times dimension "A".
5. The resistance of the terminal bar is to be less than or equal to 1 ohm with all connections made and less than or equal to 30 ohms when any one connection to electrode systems, metallic cables sheaths or neutral conductors are removed.
6. The size of the terminal bar and conductors connected to the terminal bar shall be calculated as follows:–
   – The operating time of the Distributor's primary feeder protection is to be used in Table 8.1. of AS3000.
   – For small transformers the H.V. earth conductor may be the determining factor in sizing the L.V. conductor.(The L.V. earth conductor shall not be smaller than the H.V. earth conductor).
7. To afford maximum protection, H.V. & L.V. surge diverters should be connected directly across the equipment being protected, and earthed via cable sheath or equipment frame earthing conductors to the terminal bar.

"a". Conductor sized to H.V. fault current in accordance with Table 8.1 of AS3000, however the following minimum size are to be used:–
22kV–70mm^2 copper (or equivalent)
11kV–95mm^2 copper (or equivalent)

"b". Conductor sized to L.V. fault current in accordance with Table 8.1 of AS3000, however the following minimum size is to be used:–
L.V. 120mm^2 copper (or equivalent)

"c". Conductor sized in accordance with Table 8.2 of AS3000 (Based on cross sectional area of actives) or Clause 2.2.2.3 (based on current carrying capacity of actives), whichever is the larger.

"d". Conductor size to be 4mm^2 copper.

Figure 8.6 6.6kV - 11kV or 22kV 3 Phase Substation Customer's H.V. Installation - Combined Earthing System

Appendix A

Specification for Glass Reinforced Plastic Composite Enclosures for Pillars and Cubicles.

Suggested specification for enclosures of pillars and cubicles installed in exposed locations.

Enclosures should be manufactured from a glass reinforced plastic composite (GRP) laminate comprising:

(a) An external, Isophthalic, Neo Pental Glycol (ISO NPG), UV stabilised, Lloyds approved, polyester gelcoat to a thickness of 0.5 – 0.65mm. The colour shall be environmentally acceptable, such as the 'colorbond' range, and as specified by the customer.

The external surface shall be 'fair', smooth and free from defects.

(b) The laminate shall comprise:

(i) A fire retardent orthophthalic polyester resin which when tested to AS1530(3) 1980 shall have gap indices not exceeding:

- ignitability 15 – range (0–20);
- spread of flame 8 – range (0–10);
- heat evolved 9 – range (0–10);
- smoke developed 8 – range (0–10).

(ii) 'E' glass chopped strand mat or gun roving in a resin to glass ratio of 2:1 – 2.5:1.

Thickness of the finished laminate shall be as follows:

- Enclosures up to 500mm in height – 2.5mm +/– 0.5mm;
- Enclosures up to 750mm in height – 3.0mm +/– 0.5mm;
- Enclosures up to 1200mm in height – 3.0mm +/– 0.5mm;
- Enclosures up to 1500mm in height – 4.0mm +/– 0.5mm + 3mm coremat on flat sides.

(c) General:

All laminate shall be of uniform thickness, be well compacted and be free of air inclusions.

All dimensions shall comply with the drawings provided. Components shall be free of burrs and loose fibres.

The interior surface shall be resin rich and be free from exposed fibres.

Guidelines for Private Overhead Electric Lines.

Note to User

These guidelines were published by AGL Electricity, Citipower, Eastern Energy, Powercor Australia and United Energy. These guidelines were compiled using drawings, guidelines and information that comply with 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 or currency of the material contained herein to the particular application or purpose for which it is used. These guidelines are provided to inform licensed electrical workers of the past industry practices and procedures for the maintenance or repair of Private Overhead Electric Lines. The responsibility for the administration of the Electricity Safety Act regarding Private Overhead Electric Lines rests with the Office of the Chief Electrical Inspector.

AGL Electricity, Citipower, Eastern Energy, Powercor Australia and United Energy each expressly disclaim any liability, joint or several, to anyone including, without limitation, any end–user of these guidelines, in respect of anything done or not done by them in reliance in whole or part upon the contents of these guidelines.

Appendix B Contents

Part B1 General

Part B2 Private Overhead Electric Line Maintenance

Part B3 Private Overhead Electric Construction Details

Appendix B Contents

Part B3A Cable Type Private Overhead Electric Lines

Appendix B Contents

Part B3B Open Wire Type Private Overhead Electric Lines (For Maintenance Work Only).

Part B1 General

B1.1 Introduction

These guidelines detail the historic requirements and are designed to provide information for Customer owned Private Overhead Electric Lines (POELs) operating at low voltage. It is not claimed that the information contained will cover all circumstances.

New lines are not permitted in hazardous bushfire risk areas. An exception may be granted by the Office of the Chief Electrical Inspector.

In accordance with the Electricity Safety (Installations) Regulations, a private electric line to be constructed or to be substantially reconstructed must be placed underground except that overhead private electric lines may be constructed or substantially reconstructed in a low bushfire risk area. Application for exemptions from this requirement must be made by the customer to the Office of the Chief Electrical Inspector in accordance with the Electricity Safety (Installations) Regulations.

It should be noted that such lines form portion of a customer's electrical installation and that these guidelines complement those requirements set out in the Electricity Safety (Installations) Regulations for Aerial Conductors.

Important Note: Overhead or Underground.

In the case of a private electric line for a typical individual installation, where reasonable digging conditions are encountered, a low voltage underground cable can usually be installed at a lower cost to an equivalent overhead line. Therefore even in low bushfire risk areas, the use of underground electric lines in lieu of overhead is strongly recommended, particularly for:

- continuity of electricity supply;
- reducing maintenance costs; and
- improved aesthetics.

Costs of both construction and ongoing maintenance should be carefully evaluated whenever a private overhead electric line is contemplated. With an underground cable, the risk of starting a bushfire and ongoing maintenance costs are both virtually eliminated.

Proposals for the construction or substantial reconstruction of a private overhead electric line in hazardous bushfire risk areas can only be approved by the Office of the Chief Electrical Inspector (refer to Clause 5.5.2 and B 1.3)

B1.2 Financial Conditions and Responsibility

The person or body requiring electricity supply to be available on a property shall be responsible for all wiring and apparatus necessary to take electricity from the point of supply. This includes any private electric line, whether forming Aerial Consumer's Mains (ACMs) or otherwise.

Private overhead electric lines form part of a customer's electrical installation and hence are **the responsibility of the customer**, who should ensure that they have an adequate insurance cover for the risk of bushfire and other events.

B1.3 General Conditions

In accordance with the relevant regulations, all electrical wiring work associated with the erection and maintenance of Private Overhead Electric Lines shall be carried out by appropriately qualified and authorised persons and shall be to the satisfaction of the Office of the Chief Electrical Inspector.

All Private Overhead Electric Lines shall be constructed in accordance with the standards herein except that those utilising conductors of a size less than 16 mm^2, may be erected on supports to the dimensions given in AS 3000.

The minimum size conductors for Aerial Consumer's Mains (ACMs) shall be 7/1.75 mm or 16 mm^2.

Proposals for the construction of POELs, shall be submitted to the Office of the Chief Electrical Inspector for approval before the proposed date of commencement of construction or maintenance, refer Clause 5.5.2.

ACMs should be as short as is practicable and, in general, should not exceed 200 m in length.

Private Overhead Electric Lines shall not extend beyond the boundary of the property on which the point of supply is established. Refer to Part 3, Division 4 of the Electricity Safety Act.

The proposed route and location of all poles shall be to the satisfaction of the Office of the Chief Electrical Inspector. When planning the route and pole positions due consideration should be given to the –

- length of line and each individual span;
- proximity to trees or other potential hazards (Refer to Clause B2.1)
- access for construction, maintenance and repairs;
- avoidance of crossings of railway lines, telecommunications lines, navigable waterways, etc;
- requirement that the aerial terminating span to the customer's building shall be not more than 20 m; and
- requirement that the first pole of ACMs be within 20 m of the property boundary (if supplied by an overhead service line) & not more than 45m from a Distributor pole.

B1.4 Control and Protection

In the case of ACMs in rural and fringe urban areas, a circuit breaker shall be installed at the commencement of such consumer's mains in accordance with the Electricity Safety (Installations) Regulations and Clause B1.6 whether such consumer's mains commence at the point of supply or otherwise.

In all other cases, control and protection shall be in accordance with the Electricity Safety (Installations) Regulations.

Where two ACM's commence at the same pole separate protection of each ACM is preferred. This assists the customer or REC in ACM fault location and maintenance.

B1.5 Control of Aerial Consumer's Mains by the Customer or REC

Where aerial consumer's mains are controlled in accordance with Clause B1.6, the REC shall provide a suitable operating stick for the circuit breaker. Figure B1 shows a typical device, although any equivalent arrangement could be used.

The customer may open the circuit breaker for any reason, however, it must be impressed on customers that they should not assume it is then safe to approach conductors (for tree clearing, etc) until a test is carried out by an electrically qualified person to prove that the conductors are isolated and positive means are taken, such as locking, to prevent inadvertent reclosure of the circuit breaker.

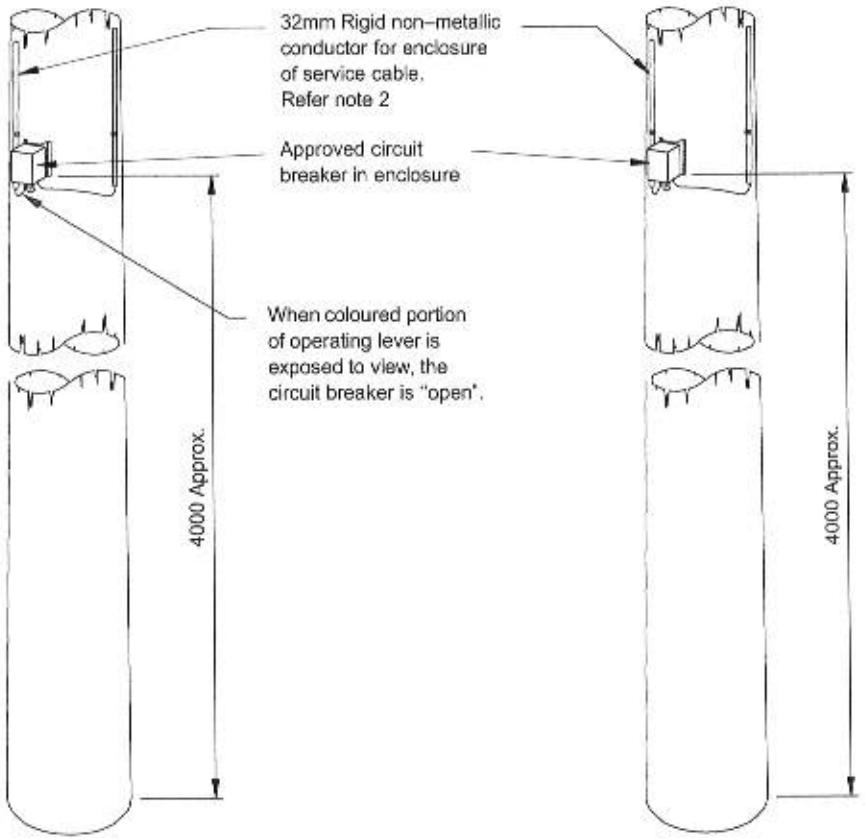
Note: Only suitably authorised and qualified persons may carry out work on a POEL (see Clause 1.3). Refer to Introductory Information – Clause E.

Subject to the provisions of the Electricity Safety (Installations) Regulations being strictly observed, an REC engaged to carry out repairs to a POEL supplied through a circuit breaker installed in accordance with these guidelines may operate the circuit breaker for the purpose of carrying out such repairs.

In each and every case where repairs are carried out, it is VITAL THAT POLARITY TESTING BE PERFORMED by the LEIW IMMEDIATELY upon restoration of supply.

Testing procedures shall be at least equivalent to those detailed in Appendix C and this shall also include disconnection of the main neutral and earthing conductors at each installation switchboard until the polarity is proved correct.

In this regard, LEIW's engaged on work of this nature are reminded that incorrect connection of consumers' mains may result in "live" earthing and that misleading indications can be obtained by testing an MEN installation only at a General Purpose Outlet.

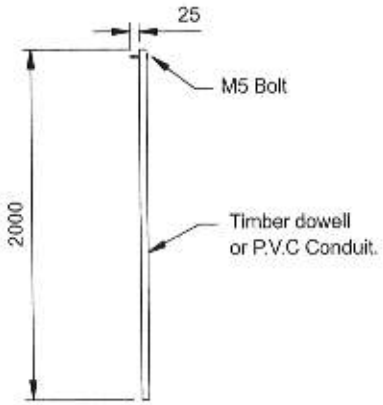


2 or 3 Wire Supply

4 Wire Supply

Special Note

Aerial consumer's mains
In Rural and Fringe Urban Areas
shall be controlled by a circuit breaker supplied by the customer. This shall be installed in lieu of a fused overhead line connector box at the origin of the aerial consumer's main.



Operating Stick

Notes

1. All equipment other than service cable supplied and installed by registered electrical contractor (REC.)
2. Installation shall comply with these guidelines and the Electricity Safety (Installations) Regulations.

Figure B1 Mounting of Circuit Breakers for Aerial Consumer Mains

B1.6 Circuit Breakers for the Control of Aerial Consumer's Mains

B1.6.1 General

Only stick operated circuit breakers accepted by the Distributor's as being suitable for the control of aerial consumer's mains shall be used. Details of such circuit breakers are available from Distributor offices.

The circuit breaker (including its enclosure) is to be mounted between 3.0 and 4.0 m above ground level with an operating lever extension protruding below the enclosure. This operating arm shall provide a visual indication of the circuit breaker position (open or closed) and shall provide for locking in the open position.

B1.6.2 First Private Pole on Property

Where supply is made available to the property by means of an overhead service line, the circuit breaker shall be installed on the customer's first private pole (ie. the point of supply). The REC shall install and wire the unit ready for connection of the Distributor's service cable to the supply terminals of the circuit breaker as shown in Figure B1. The REC shall also supply and fix separately a length of rigid light-duty grey non-metallic conduit of not less than 32 mm diameter to the pole extending from the point of attachment for the overhead service line to the lower edge of the circuit breaker enclosure for the installation of the service cable by the Distributor.

B1.6.3 Termination

Circuit breakers shall be suitable for connection of up to 35 mm^2 stranded conductors of either aluminium or copper.

Where consumers mains are increased in cross sectional area to provide for voltage drop, etc, it is the REC's responsibility to make a suitable conversion/connection and satisfy the appropriate Electricity Safety (Installations) Regulations (e.g. circuit breaker mounted on a junction box).

B1.6.4 Pole or Substation on Property

Where the circuit breaker is to be mounted on a Distributor pole, the REC must supply a circuit breaker unit ready for connection by the Distributor. Standard service cable connections will be used, the service cable being run down the pole in a similar fashion to that described above and as detailed in Figure B1.

The circuit breaker unit will be mounted by the REC and connected by the Distributor. The REC must leave sufficient length of conductors and fixing equipment such as conduit, saddles and bands to enable the circuit breaker to be connected to the Distributor's equipment.

Part B2 Private Overhead Electric Line Maintenance

B2.1 General

The customer shall be responsible for maintenance of the Private Overhead Electric Line, including clearing of trees from the line in accordance with the Electricity Safety (Electric Line Clearance) Regulations. However, the Distributor at all times reserves the right, subject to the requirements of the Electricity Safety Act, to inspect the line and at the discretion of the Responsible Officer to direct that works be carried out.

Where the Distributor determines that tree clearing is required to maintain the clearances specified in the Electric Line Clearance (Vegetation), the customer shall be advised by written notice that the necessary tree clearing must be performed within a specified period.

Notwithstanding the foregoing, where, after consideration of the degree of hazard involved, the Distributor's Responsible Officer considers immediate action is necessary, electricity

supply shall be disconnected from the line forthwith after issuing a notice requiring immediate action in compliance with the Electricity Safety Act.

Maintenance other than tree clearing shall be carried out by a REC who shall consult with the Office of the Chief Electrical Inspector before commencing work.

B2.2 Requirement to Modify Existing Private Overhead Electric Lines

Customers are advised that any private overhead electric lines which have been constructed to a superseded specification shall be modified so as to comply with these guidelines where, in the opinion of the Office of the Chief Electrical Inspector, any addition, or alteration or repair of the line affects the safety of the line. Existing constructions which have not proved satisfactory such as vertical construction may require substantial modification or preferably be replaced with a private underground line.

Notwithstanding the above, a Private Overhead Electric Line which was constructed to a superseded specification and which complies with such superseded specification in every respect may, subject to the following provisions, be repaired to a standard that was acceptable when that part of the installation was originally installed, provided that:

- the tree clearing is maintained to the Code of Practice for Electric Line Clearance (Vegetation);
- a conductor spreader is fitted to each span of horizontal or vertical open wire constructed line to reduce the likelihood of conductors clashing;
- in the case of aerial consumer's mains in rural and fringe urban areas, a circuit breaker under the control of the customer, is installed at the commencement of such consumer's mains in accordance with Clause B1.6; and
- poles are stayed where appropriate. Additional poles may be required where the foundation of poles can be shown to be inadequate for the actual loads.

Part B3 Private Overhead Electric Line Construction Details

B3.1 Types of Private Overhead Electric Line

Two types of Private Overhead Electric Lines, defined as "Cable Type" and "Open-Wire Type", are described herein :

- Cable Type private lines may be considered as the simplest acceptable form of construction and is confined to the use of multi-core aerial cable within the limits specified in Clause B3.2.
- Open-Wire Type private construction is defined as open-wire construction within the Limits specified in Clause B3.2. For bushfire and safety reasons, "open wire type" private construction shall not be used for new construction.
- Where the limits of Clause B3.2 are exceeded, full standard Distributor design and construction practices shall be used together with the requirements of Parts B1 and B2 of these guidelines.

Notwithstanding the requirements detailed hereinafter, variations may be made at the discretion of the Office of the Chief Electrical Inspector where considered necessary for particular cases.

B3.2 Limitations

Refer to Clauses B1.1, B1.4 and Clause 5.5.2 regarding conditions of use of Private Overhead Electric Lines.

Private lines to these guidelines may be used provided they comply with the following:

- 0.6/1kV grade Insulated cable;
- comprise of not more than 4 conductors;
- the conductor size is not greater than 35 mm^2 copper or 95 mm^2 LVABC; and
- the poles are spaced not more than 45 m apart.

Pole requirements are common to both types of private construction and these have been listed separately.

The requirements for Cable Type private construction cover the use of multi-core cable and the requirements for Open-Wire Type private construction cover the use of single aerial conductors.

B3.3 Poles

B3.3.1 General

Poles shall be of such length as is required to provide the specified clearance for conductors (See Clause B3.6 – "Clearances"), and may be of wood, steel, concrete or other material as may be approved by the Office of the Chief Electrical Inspector.

All poles shall have a minimum long duration safe working strength of 2 kN and be of suitable durability.

Poles shall be set to a depth of not less than 1/6 the overall length subject to a minimum of 1.3 m and where installed in poor soils shall be set in concrete and have a log placed against the direction of load – refer to Figure B2. The backfill shall be consolidated by ramming and the surface soil sloped away from the pole to assist drainage and pole durability. Where soil provides poor footing strength, additional measures shall be taken such as sinking the pole deeper, setting in concrete, installing surface logs as shown by Figure B2, adding stays or by other suitable means.

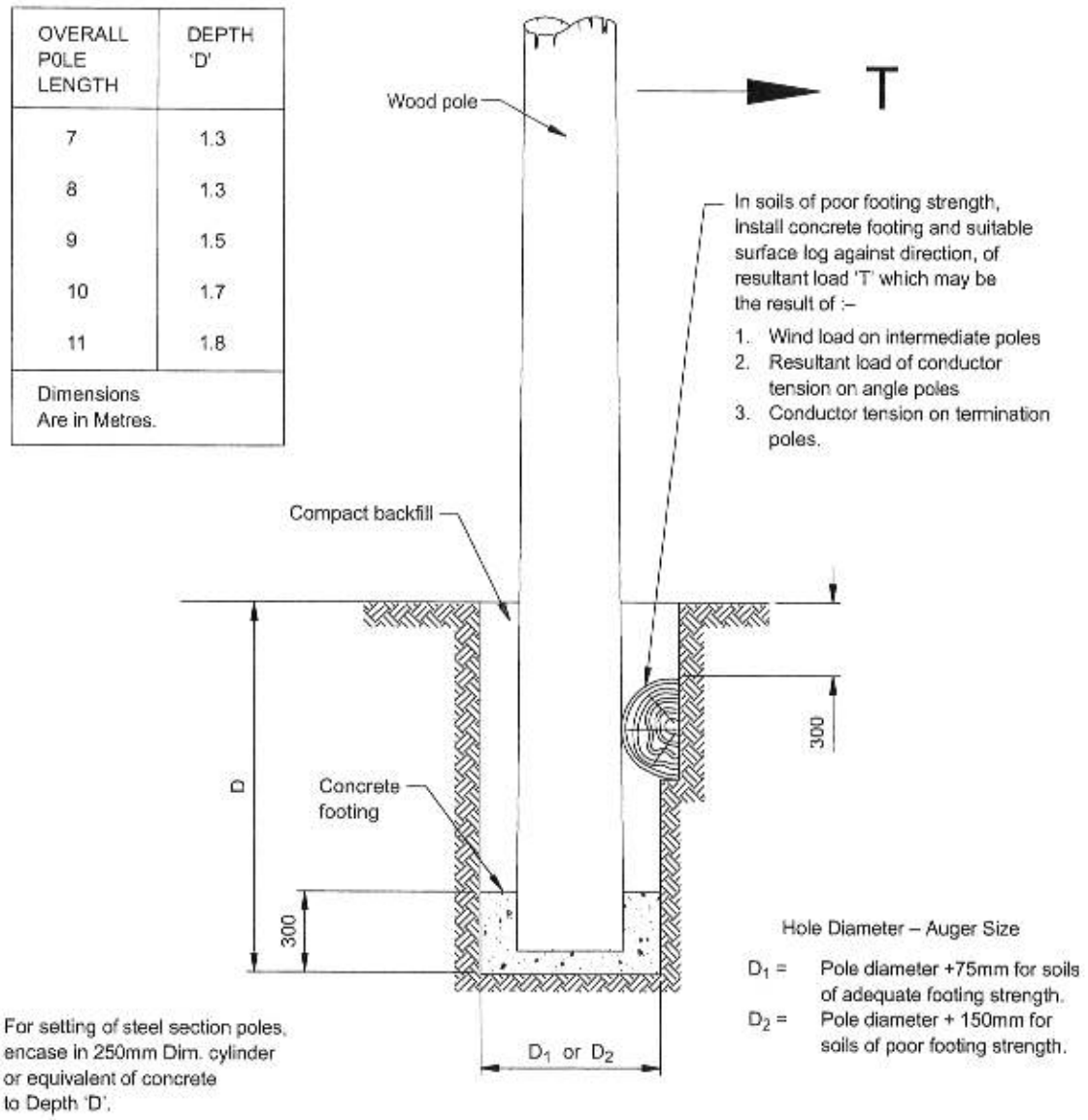


Figure B2 Setting of Poles

B3.3.2 Wood Poles

Wood poles shall be of suitable species of timber, sound and reasonably straight. All bark shall be removed, the butt cut off square and a suitable weather shield fitted to the head of each pole. Wood poles should not be used in known termite areas.

Except for wood poles of Class 1 durability, as shown by Table B1, all natural timber poles shall be pressure treated in accordance with AS 2209 with a suitable timber preservative compound.

Table B1 Wood Pole Types

Wood Poles	
Class 1 Durability Untreated (or treated)	**Lesser Durability (Treated only)**
Ironbark	Messmate
White Mahogany	Yellow Stringybark
Tallowwood	White Stringybark
Grey Box	Radiata Pine
Grey Gum	Blackbutt & Spotted Gum

The diameter of all wood poles shall not be less than 250 mm at the butt and 175 mm at any point.

Before backfilling, wood poles shall be treated with a suitable timber preservative at the butt end, head and extending 500 mm either side of the ground level.

B3.3.3 Steel Poles

Steel poles shall be suitably protected from corrosion by hot dip galvanising to AS 1650, or may be fabricated from pre-galvanized material having joints, etc., suitably treated from corrosion after fabrication.

Hollow sections shall be coated internally with similar protection for the length below ground level and fitted with a suitable cap at the head of the pole.

All steel poles shall have an additional anti-corrosion protection for the part of the pole which is installed below ground level. Care shall be taken to ensure that any coating system is not damaged during installation.

Steel poles which are capable of withstanding an ultimate load of 4kN in any direction applied horizontally at the head of the pole may be used for Private Overhead Electric Lines.

Alternatively Steel Poles of standard sections are shown in Table B2 and shall be set in concrete to a depth as shown by Figure B2. Approved Commercial Steel Poles shall be installed in accordance with manufacturer's instructions.

Table B2 Steel Pole Types

Steel Poles		
Type	**Minimum Section (mm) for Pole Length**	
	7 Metre.	**10 Metre.**
I Beam Grade 250	205 x 135 x 8	205 x 135 x 8
Channel	152 x 76 x 6	178 x 76 x 7
Tube	165 OD x 4.5 152 x 5.4	168OD x 7.1 165 x 8.0
Hollow Section	127 x 127 x 4.9 152 x 102 x 6.3	152 x 152 x 4.9 203 x 102 x 6.3

Note: Attention is directed to the need to "earth" steel poles and concrete poles where required by the Electricity Safety (Installations) Regulations.

B3.3.4 Concrete Poles

Commercial concrete poles capable of withstanding an ultimate load of 4kN in any direction applied horizontally at the head of the pole may be used for Private Overhead Electric Lines.

Note: Drilling of concrete poles is **not permitted** as ingress of moisture can lead to pole failure – refer to Clause 5.4.3.6 (c).

B3.3.5 Other Poles

Poles of other material shall be of suitable durability and shall have strengths as follows:

- Pole strength – capable of withstanding a horizontal force applied at the head of the pole of not less than 2 kN in any direction for short duration loads and 1.5 kN for long duration loads.
- Footing strength – at least sufficient to satisfy the pole strength.

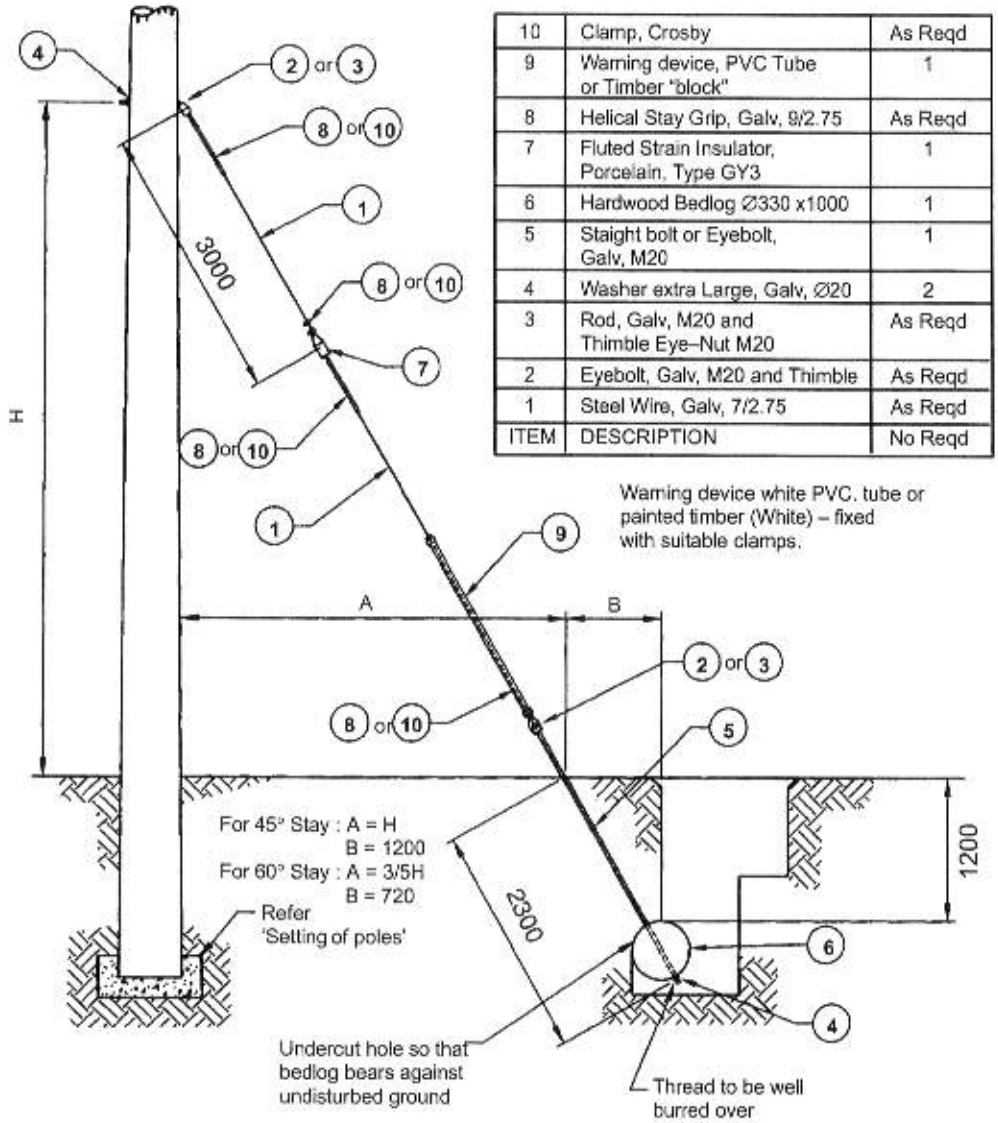
Such poles shall be suitably protected against deterioration below ground level.

B3.4 Stays

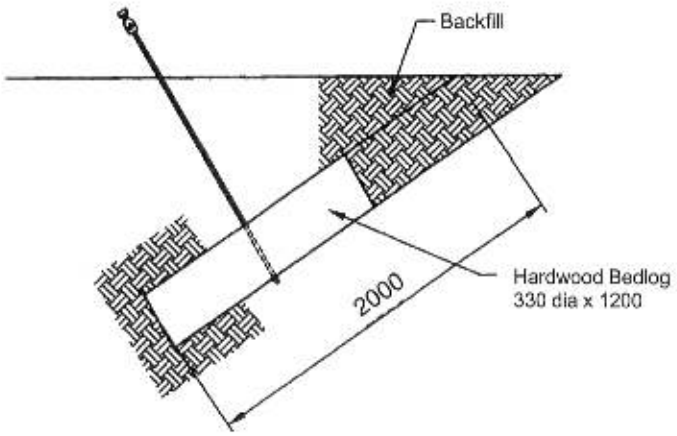
Stays shall be of galvanised steel strand of not less than 7/2.75 mm stranding having an ultimate tensile strength of not less than 1310 MPa. They may be inclined at either 60° or 45° to the horizontal, as convenient, and shall include a fluted strain insulator (for example, Type GY1) to AS 3609. A warning "block" painted white, or other suitable device, may be fitted if desired. In general, stays shall conform with Figure B3 unless otherwise specified herein or authorised by the Office of the Chief Electrical Inspector.

Stays shall be installed in the following cases:

- where there are two or more poles in the line, at the first pole of the line, against the pull of the cable in the intervening spans and, at the last pole of the line, against the pull of the cable in the intervening spans;
- at poles where the angle of deviation of the line is greater than 15°, against the resultant pull of the cable in line with the bisect of the angle. Where the angle of deviation is greater than 45°, two stays shall be installed, one against the pull of each line of cable; and
- at any other point as specified by the Office of the Chief Electrical Inspector, ie., where there is unstable soil.



10	Clamp, Crosby	As Reqd
9	Warning device, PVC Tube or Timber "block"	1
8	Helical Stay Grip, Galv, 9/2.75	As Reqd
7	Fluted Strain Insulator, Porcelain, Type GY3	1
6	Hardwood Bedlog Ø330 x1000	1
5	Staight bolt or Eyebolt, Galv, M20	1
4	Washer extra Large, Galv, Ø20	2
3	Rod, Galv, M20 and Thimble Eye–Nut M20	As Reqd
2	Eyebolt, Galv, M20 and Thimble	As Reqd
1	Steel Wire, Galv, 7/2.75	As Reqd
ITEM	DESCRIPTION	No Reqd



Alternative Stay Bedlog Installation

Figure B3 Methods of Installing Stays

B3.5 Hardware

Brackets shall be attached to poles by means of at least one bolt right through the pole. Where a single bracket is used on an intermediate pole, the bracket shall be installed on the pole on the inside of any angle of deviation of the line.

Ferrous metal used for hardware shall be hot dipped galvanised to AS 1650 or otherwise suitably protected against corrosion. Hardware shall at all points be securely tightened, and when in contact with wood, should be liberally coated with Timber Preservative Compound or a suitable class of chassis grease before fitting

B3.6 Clearances

B3.6.1 Cable Clearance from Ground

For the purpose of this Clause, the term "ground" shall include any unroofed elevated area accessible for traffic or resort such as a terrace, sun deck, landing, platform or bridges. The clearance of cables from ground at an ambient temperature of 50°C shall not be less than that shown in Table B3.

Table B3 Ground Clearances

Type of Conductor	Minimum Height Above Ground			
	Line Span		Last span to customer's building or terminating structure.	
	Centre of Driveway	Elsewhere	Point of Attachment	Elsewhere
Bare	5.5 m	5.0 m	Bare actives not permitted.	
Insulated or Neutral Screened Cable	5.5 m	4.6 m	3.0 m	3.9 m

Notes:

- An allowance of 200mm shall be made for variations in sag from 15°C to 50°C.
- In general, areas subject to farming activities are regarded as accessible to vehicles and hence the clearance for "Centre of Driveway" should be applied.

B3.6.2 Conductor Clearance from Structures

Clearance from structures shall be in accordance with Table B4.

Table B4 Clearance from Structures

Type of Conductor	Clearance from Structures	
	Above any part of any roof or similar structure not normally accessible for traffic or resort.	**From any point of the opening of any window or from any point of any balcony or similar place of resort, provided that the conductor may be erected at a height not less than 0.6 m from the top of any such window.**
Bare (or covered)	3.0 m	1.5 m
Insulated or Neutral Screened Cable	2.1 m	1.0 m

B3.6.3 Conductor Clearance from Telecommunication Lines

All crossings shall be in accordance with the "Code of Practice for Overhead Power and Telecommunication In-Span Crossings", "Code of Engineering Practice for Shared Use of Poles" and Figure B4. A summary of the relevant requirements is set out below –

- Conductors shall cross above telecommunication lines, except that in M.E.N. areas and by arrangement with the Telecommunication Company, neutral screened cable may cross under telecommunication lines.
- Conductors shall be kept to the minimum clearances as shown in Figure B4, in all directions of telecommunication lines and telecommunication subscribers' leads. These clearances shall be increased if the cable span does not terminate on a customer's building or terminating structure – refer to Figure B4.

B3.6.4 Conductor Clearance from Telecommunication Supports

Conductors shall be separated horizontally by at least 2.4 m from the vertical projection of any telecommunication support unless –

- they pass above telecommunication line or subscriber's lead, and a clearance of 2.4m is maintained from the telecommunication conductors and support in all directions; or
- they are attached with the consent of the Telecommunication Company to the head of the telecommunication support and a vertical clearance of 0.75 m or 1.2m for PSTN is maintained between the LV. conductors and the centre of the telecommunication conductor and the centre of the telecommunication conductor support. (PSTN – Telstra's Public Switched Telephone Network)

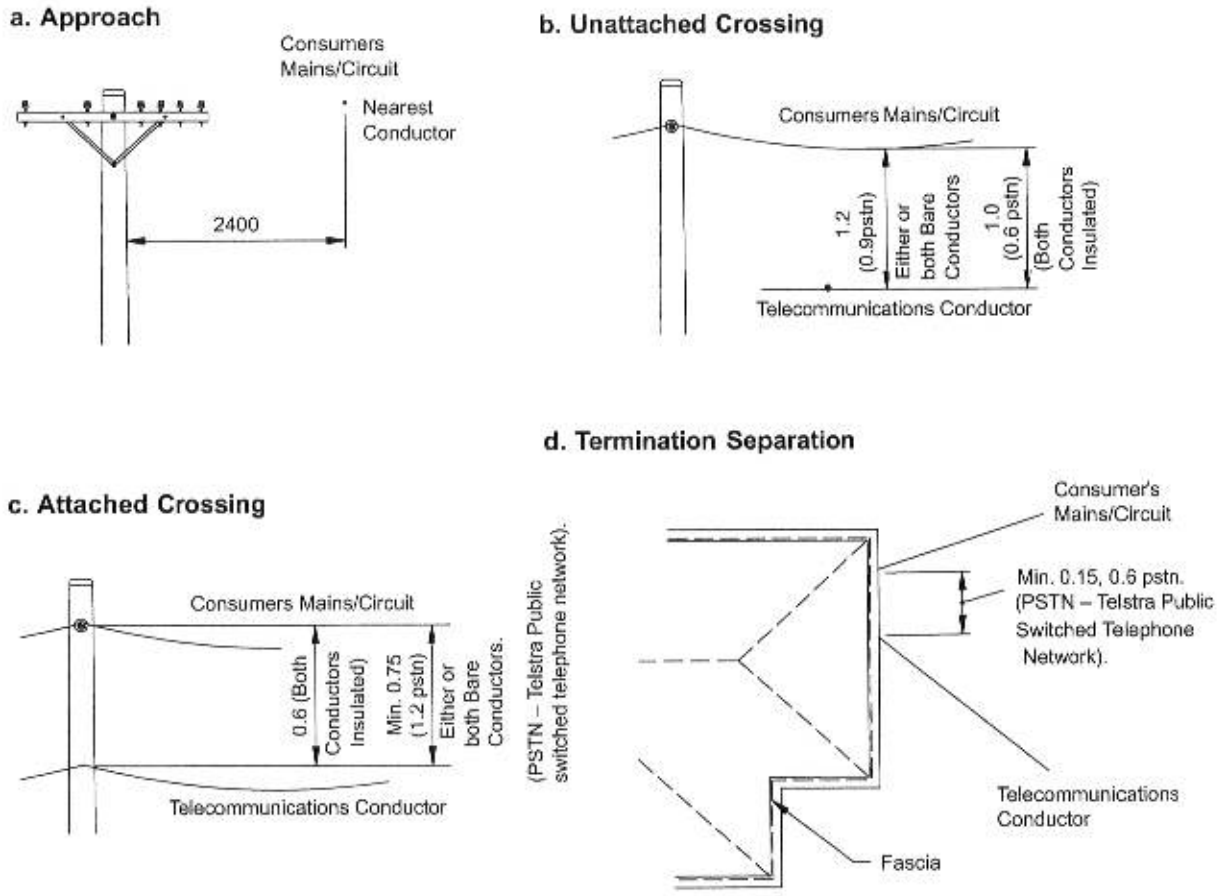


Figure B4 Clearance and Separations from Telecommunication Lines

B3.6.5 Conductor Clearance from Other Electric Power Lines

The requirements for approach or crossings shall be determined by consulting the Office of the Chief Electrical Inspector. In general, unattached crossing of Distributor lines is not permitted.

Part B3A Cable Type Overhead Electric Lines

B3.7 Structure Types and Deviations Limits

Figures B5 to B7 depicts typical structure types and appropriate deviation limits where the line changes direction. Reference should also be made to Clause B3.4 which specifies the requirements for stays.

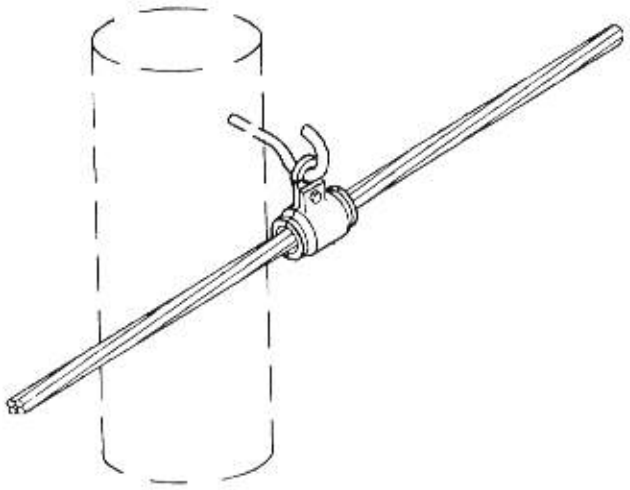


Figure B5 Intermediate and Angle Type 1.
(Where the line changes direction from 0° to 25°)

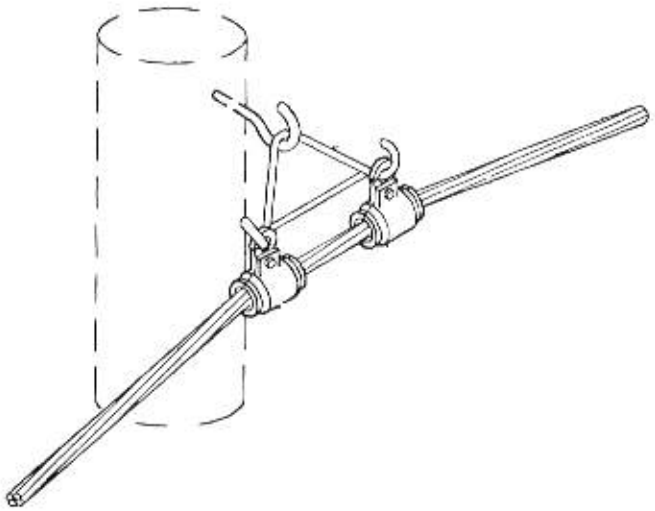


Figure B6 Angle Type 2.
(Where the line changes direction from 0° to 50°)

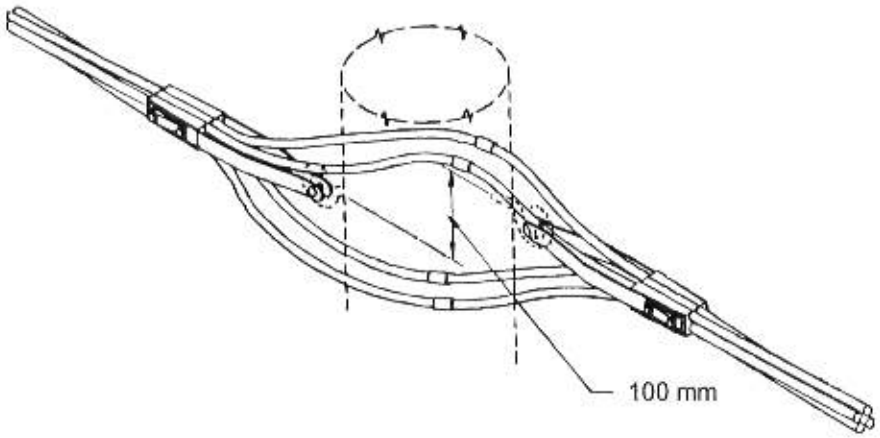


Figure B7 Anchor and Strain. (For changes in tension and/or where the line changes direction from 0° to over 50°)

B3.8 Cable

B3.8.1 Cable and Conductor Types

Aluminium conductor is not permitted in bushfire prone areas unless it is Low Voltage Aerial Bundled Cable (LVABC) to AS 3560. Copper cables shall comply with AS 3116, AS 3147 or AS 3155.

Note: In areas where birds (particularly members of the parrot family) attack overhead lines, the use of insulated and sheathed neutral screened aerial cable or LV ABC is recommended.

B3.8.2 Conductor Sizes

– The minimum size of copper cable used for ACMs shall be 16 mm^2.

– The minimum size of LV ABC cable used for ACMs shall be 25 mm^2.

Selection of any conductor sizes in terms of length of line and maximum demand of installation shall be calculated in accordance with the Electricity Safety (Installations) Regulations. Due allowance should be made for future load growth when determining the maximum demand and the permissible voltage drop for each particular case.

B3.8.3 Cable Handling and Straining

Cables shall at all times be handled with care to ensure that no damage is done which might ultimately result in overheating and breaking of conductors in service.

Cable shall be rolled off cable drums and not "flaked off". Care shall be taken to ensure that the conductor is not dragged over rough surfaces and that no severe kinking takes place.

Parallel webbed cable shall be erected with not less than one 360° twist each 5 m of span length.

Cable shall be strained with a rope snotter of appropriate size as shown in Figure B8.

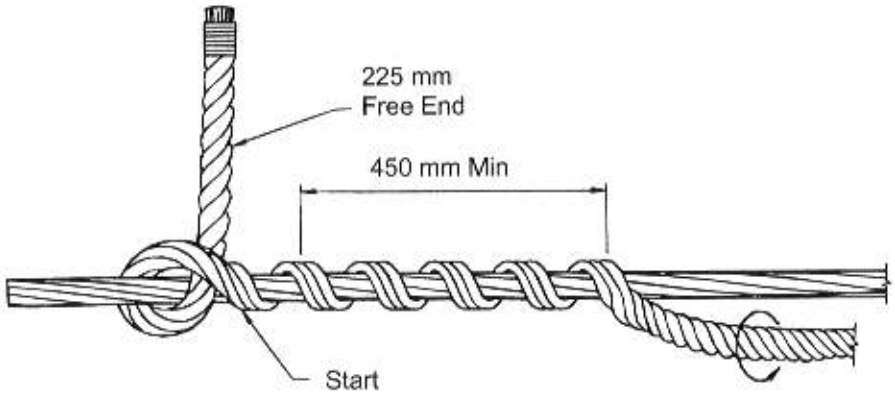


Figure B8 Rope Snotter

B3.8.4 Cable Sagging

Cable shall be sagged to Table B5, Table B6 or Table B7 as appropriate for the type of cable used. Spans must be designed so that after sagging, the cables shall satisfy the clearance requirements as specified in pages B–14 to B–16.

Table B5 Minimum Stringing Sag (m).

Insulated Parallel Webbed and Twisted Copper, Aerial Cable to AS 3147

Cable Type	Standard (2 kN SWL) Bracket			Small (1 kN SWL) Raiser
	Span Length			20 m Span
	15 m	30 m	45 m	
2 x 16 mm^2	0.2	0.4	1.0	0.4
3 x 16 mm^2	0.2	0.5	1.2	0.5
4 x 16 mm^2	0.2	0.7	1.5	0.6
2 x 25 mm^2	0.2	0.7	1.5	0.6
3 x 25 mm^2	0.2	0.8	1.8	0.7
4 x 25 mm^2	0.3	1.0	2.2	0.9
4 x 35 mm^2	0.3	1.4	2.7	1.2

Table B6 Minimum Stringing Sag (m).

Insulated and Sheathed, Neutral Screened, Copper Aerial Cable to AS 3155

Cable Type	Standard (2 kN SWL) Bracket			Small (1 kN SWL) Raiser
	Span Length			20 m Span
	15 m	30 m	45 m	
2 x 16 mm^2	0.2	0.4	1.0	0.4
3 x 16 mm^2	0.2	0.7	1.5	0.6
4 x 16 mm^2	0.3	0.8	1.8	0.7

Table B7 Minimum Stringing Sag (m).

Low Voltage Aerial Bundled Cable to AS 3560

Cable Type	Standard (2 kN SWL) Bracket			Small (1 kN SWL) Raiser
	Span Length			20 m Span
	15 m	30 m	45 m	
2 x 25 mm^2	0.15	0.3	0.85	0.25
3 x 25 mm^2	0.15	0.4	1.05	0.25
4 x 25 mm^2	0.2	0.5	1.25	0.35
4 x 35 mm^2	0.2	0.6	1.5	0.35
4 x 95 mm^2	0.35	1.2	2.8	0.6
4 x 150 mm^2	0.45	1.7	3.8	NA

Notes to Tables B5, B6 and B7 :

- The Sags shown are the **minimum** allowable sags with no electrical load.
- To determine minimum sag for other span lengths, interpolate the values in the tables.
- For other sizes of cable refer to AS 3000.

B3.8.5 Cable Terminations

Cable termination fittings shall be of a type suitable for use with the particular type of cable used.

Termination fittings shall be attached to poles and structures with suitable brackets (Refer to Clause B3.9 – "Structure Types and Deviation Limits").

Cables shall be terminated in the following situations except where otherwise specified or authorised by the Office of the Chief Electrical Inspector:

- In the case of Aerial Consumer's mains, at the first pole of the line. Such termination shall satisfy the requirements of Clause B1.4.
- At poles where the deviation of the line is greater than 60°.
- At any other point as may be specified by the Office of the Chief Electrical Inspector.

B3.8.6 Cable Connections

All connections between terminated cables and other conductors shall be made with a suitable overhead line connector, junction box or other approved means.

B3.8.7 Prohibited Joints

Joints shall not be made in cables which are in tension (i.e. mid-span).

Part B3B Open Wire Type Private Overhead Electric Lines (For Maintenance Work Only).

B3.9 Structure Types and Deviation Limits

Open Wire Type Private Overhead Electric Lines construction shall not be used for new construction, however, typical structure types and deviation limits are shown in Figures B9 to B15 for maintenance purposes.

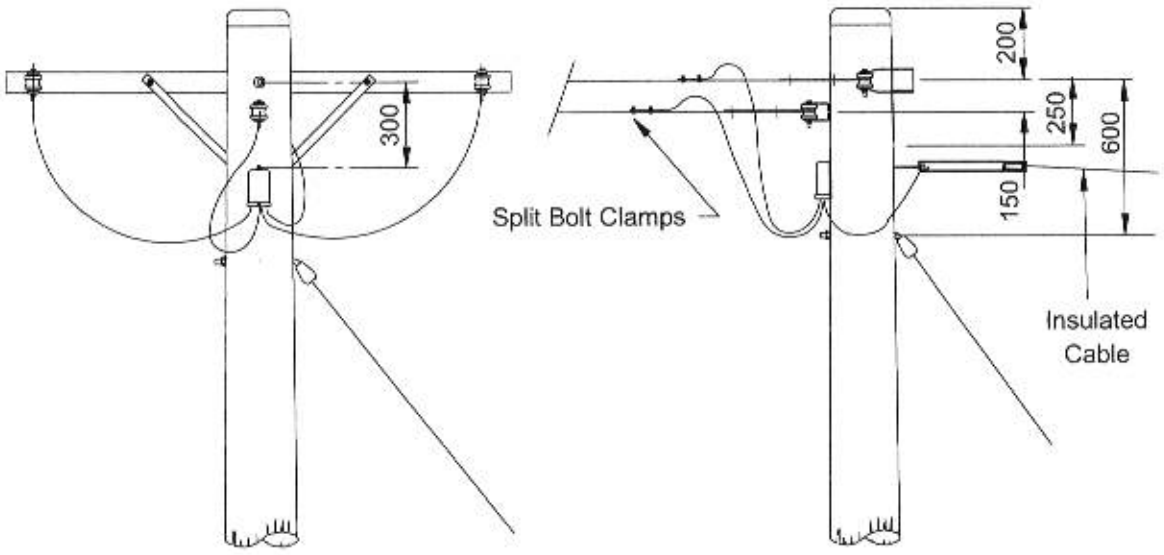
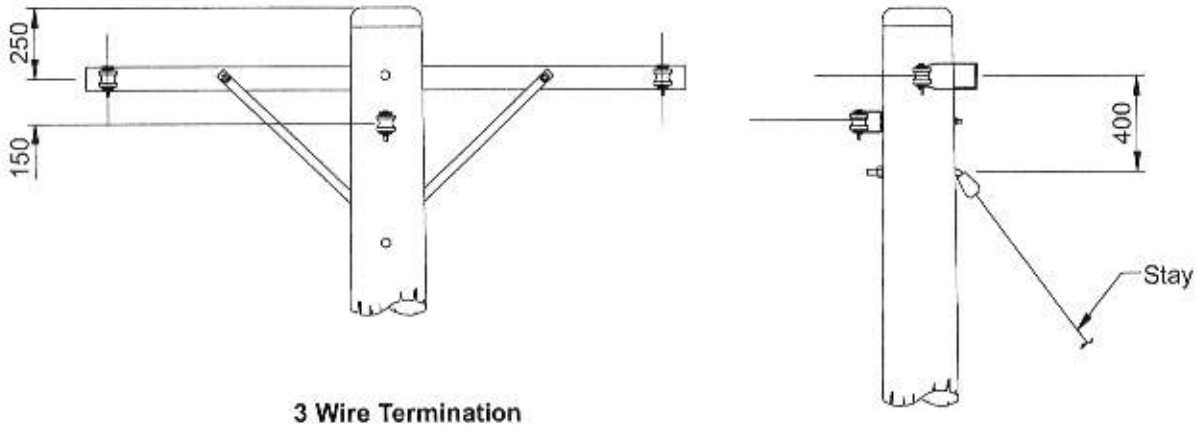
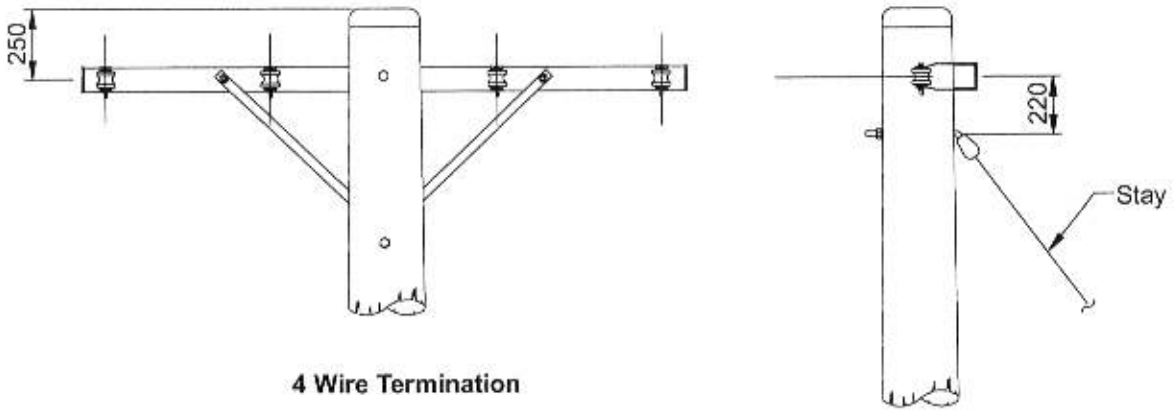


Figure B9 Cable to Open Wire Structure. (Where open wire conductors are terminated and multicore cable is used in the last span to a building or structure)



3 Wire Termination



4 Wire Termination

Figure B10 Open Wire Termination Structures (Where conductors are terminated)

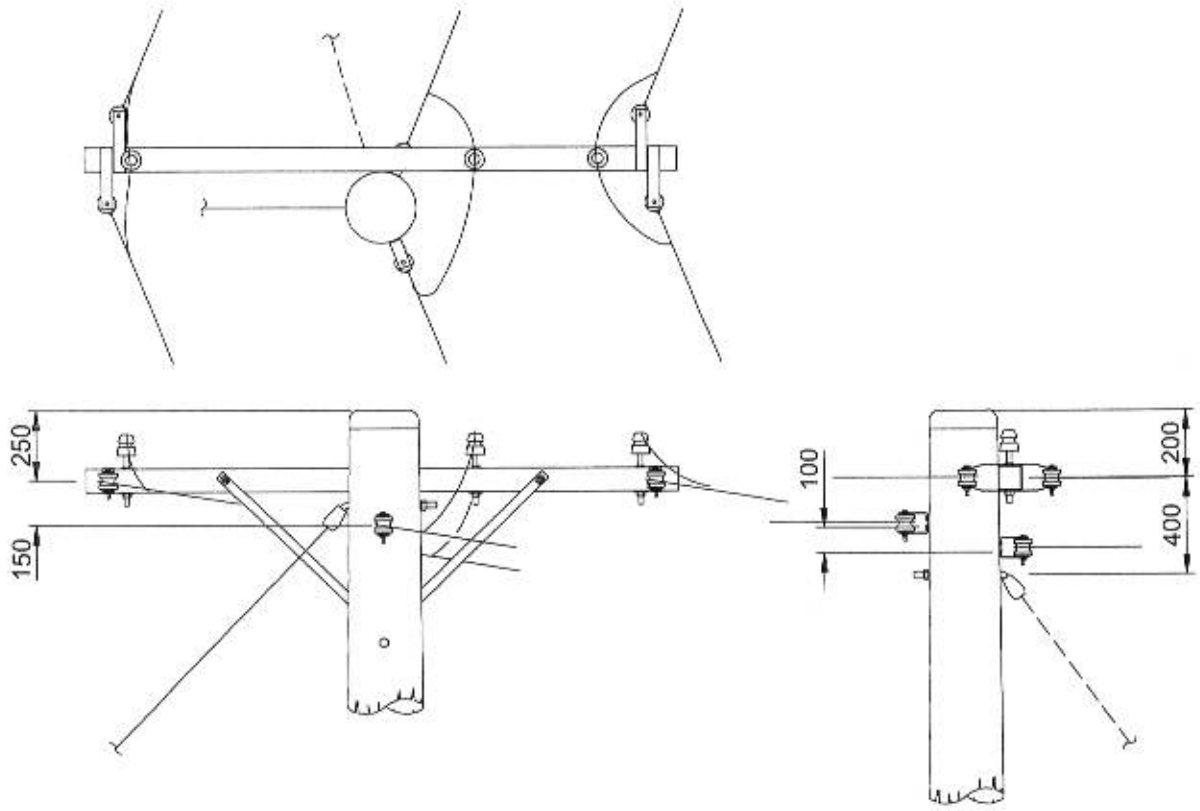
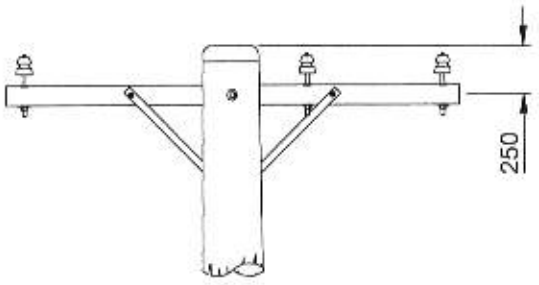
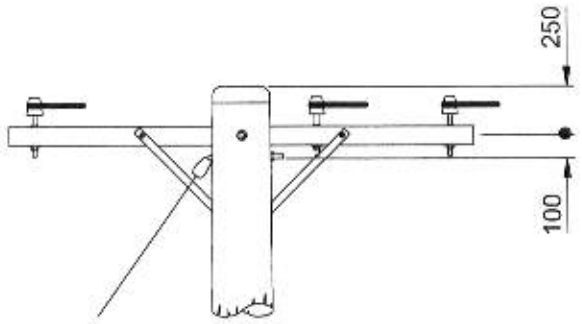


Figure B11 Open Wire Strain Structures
(Where conductors are strained)



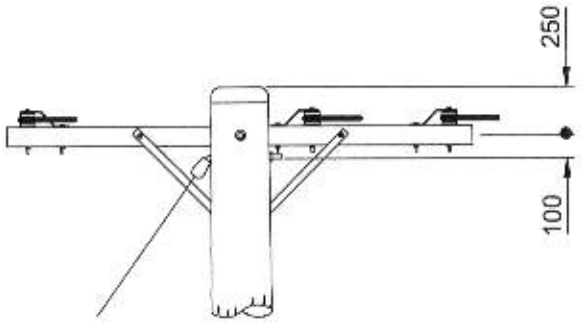
0° – 5° Deviation

Figure B12 Open Wire Intermediate Structures
(Where the line changes direction from 0° to 5°)



5° – 15° Deviation

Figure B13 Open Wire Angle Type 1 Structures
(Where the line changes direction by more than 5° but not more than 15°)



15° – 45° Deviation

Figure B14 Open Wire Angle Type 2 Structures
(Where the line changes direction by more than 15° but not more than 45°)

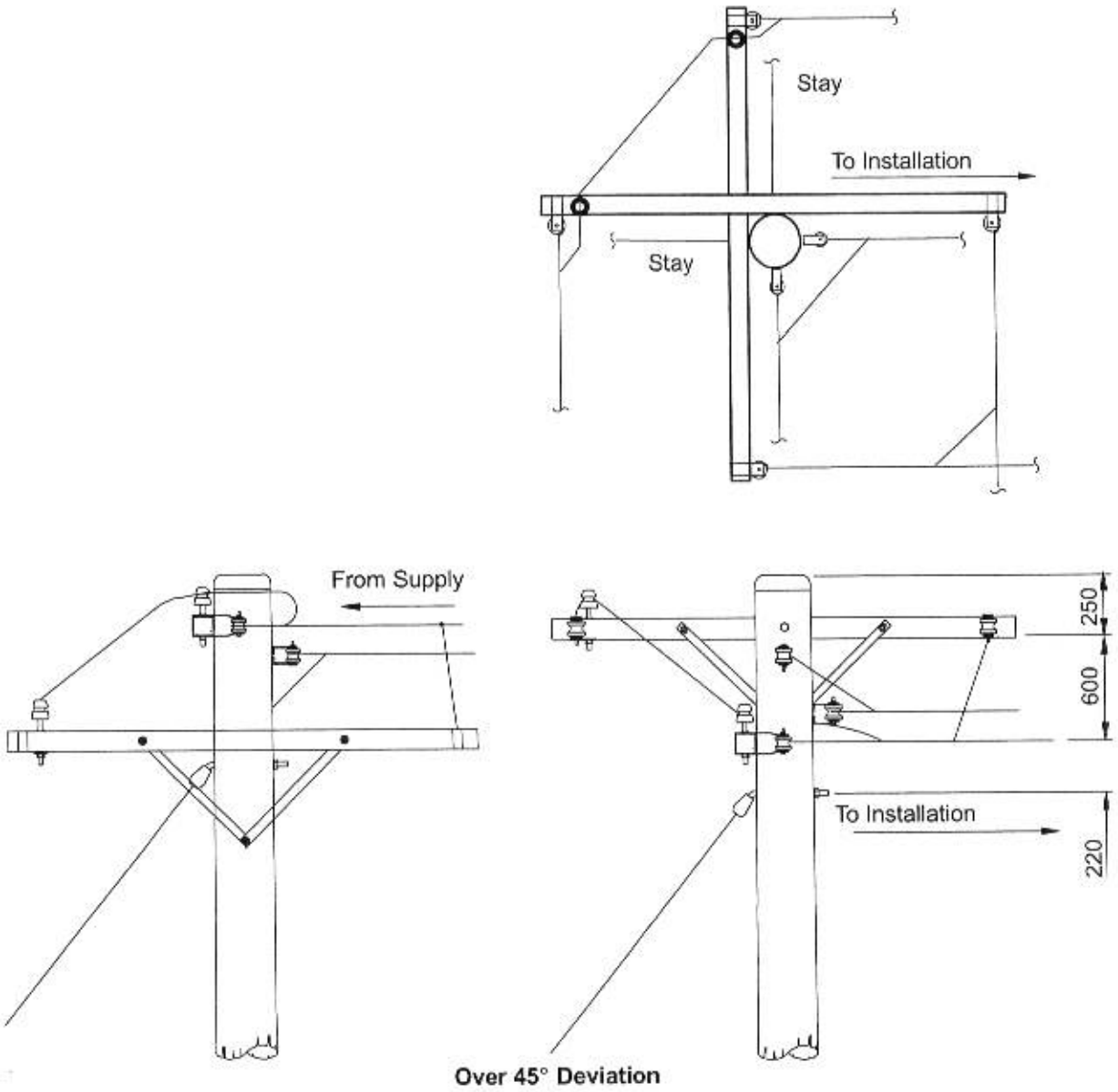


Figure B15 Open Wire Anchor Structures (Where the line changes direction by more than 45°)

Note: In other cases, where the line changes direction, crossarms shall be erected in the bisect of the angle of deviation (i.e. one half of the angle of deviation shall occur on each side of the crossarm).

B3.10 Open Wire Aerial Conductors

B3.10.1 Conductor General

The following general conditions apply to open wire aerial conductors:

- Aluminium conductor is not permitted for new or replacement work;
- Un-insulated (bare) conductors shall not be used for new work;
- Terminating spans must be insulated conductors.

B3.10.2 Conductor Specification

Bare Conductors shall be hard drawn stranded copper complying with AS 1746.

Insulated Conductors shall be either–

- PVC insulated and sheathed cables having the sheath coloured black and comply with AS 3147; or
- insulated cables having insulation coloured black and comply with AS 3198; or
- weatherproof elastomeric insulated cables complying with AS 3116.

B3.10.3 Conductor Handling

Conductors shall at all times be handled with care to ensure that no damage is done which might ultimately result in overheating and breaking of the conductor in service.

Wherever possible, the conductors should be laid out from the back of a vehicle, but where this cannot be done, care should be taken to ensure that the conductor is not dragged over rough surfaces and that no severe kinking takes place. Cables should not be "flaked" off drums.

B3.10.4 Conductor Straining

Bare – For straining bare conductors a rope snotter or any other suitable straining device should be used.

It is desirable that running sheaves be used during stringing to avoid abrasion to the conductor.

Insulated – A rope snotter shall be used when straining insulated conductor as shown in Figure B8.

B3.10.5 Conductor Sagging

Standard Conductors (see Clause B3.10.2) shall be sagged to 1.1 m.

Spans must be designed so that after sagging, the conductors shall satisfy the clearance requirements as specified in Clauses B3.6.1 to B3.6.7 inclusive.

Conductor Clearance from Ground – For the purpose of this Clause, the term "ground" shall include any unroofed elevated area accessible for traffic or resort such as a terrace, sun deck, landing, platform or bridge.

The clearances of conductors from ground at an ambient temperature of 50°C shall not be less than that shown in Table B3. An allowance of 0.2 m shall be made for variation in sag from 15°C to 50°C.

B3.10.6 Conductor Terminations

Except when otherwise specified by the Office of the Chief Electrical Inspector, conductors shall be mechanically terminated (on the appropriate structure – see Clause B3.9) in the following situation:

- At the first and last poles of the line;
- At poles where uplift of the conductors is unavoidable;
- At any other point as may be specified by the Office of the Chief Electrical Inspector.

A typical arrangement for conductor termination is shown in Figure B16.

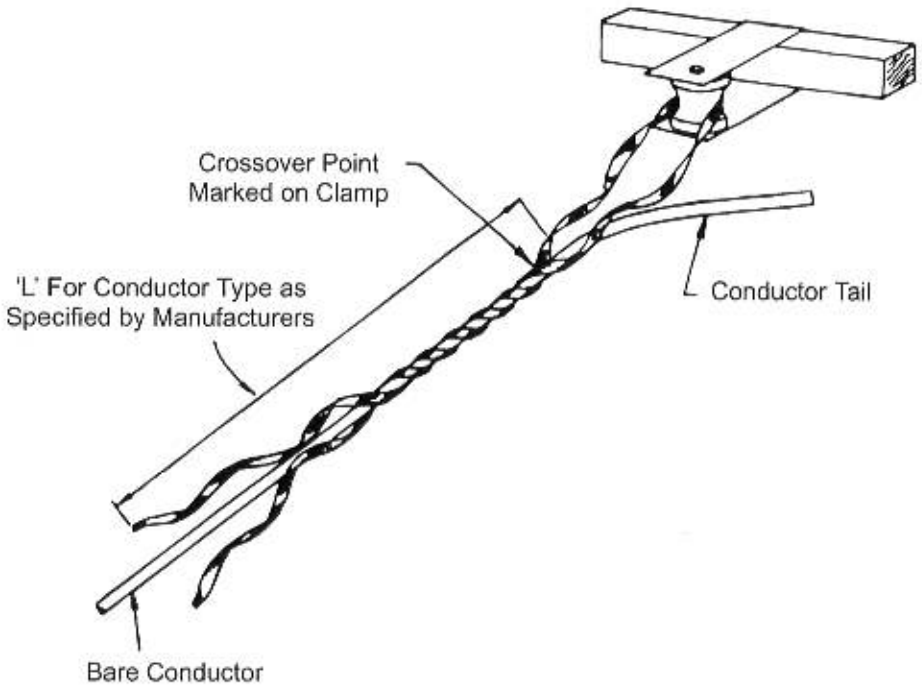


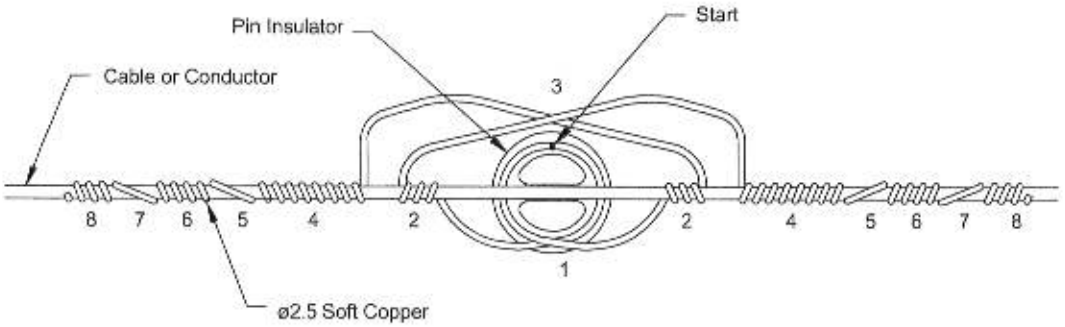
Figure B16 Helical Type Termination Detail

B3.10.7 Mid-Span Joints

Joints in conductors in tension shall be made to the satisfaction of the Office of the Chief Electrical Inspector.

B3.10.8 Conductor Ties

Conductors shall be tied to insulators as shown in Figures B17 and B18 using 2.5 mm diameter Soft Copper tie wire.

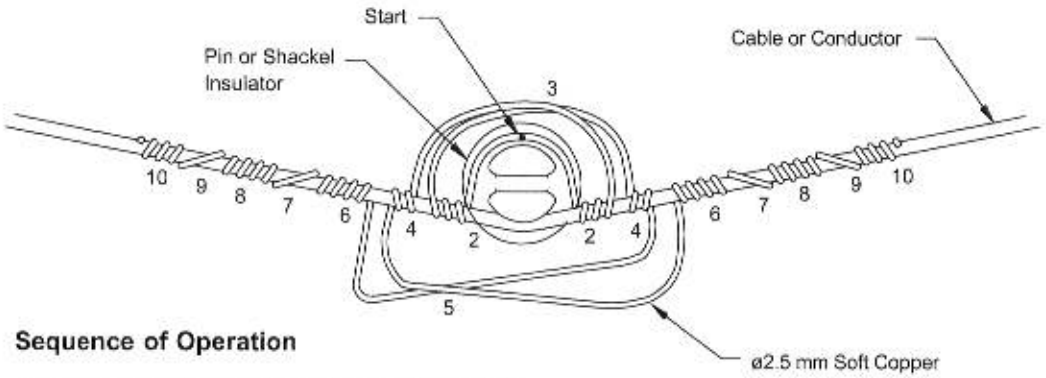


Sequence of Operation

Halve tie, and work with middle of tie at back of insulator

1. Take 1 turn around insulator, passing ends of tie in front of insulator and under conductor on each side of insulator.
2. Take 3 close turns around conductor on each side.
3. Pass ends of tie behind insulator and under conductor on each side. Then around conductor on each side of insulator.Take.
4. 8 Close turns.
5. 1 Open turn.
6. 5 Close turns.
7. 1 Open turn.
8. 3 Close turns.

Figure B17 Tie for Pin Insulator for Maximum Line Deviation – 5°



Sequence of Operation

Halve tie, and work with middle of tie at back of insulator

1. Bring ends of tie around insulator and under conductor on each side.
2. Take 2 close turns around conductor on each side
3. Pass ends of tie around back of insulator and under conductor on each side.
4. Take 2 close turns around conductor on each side.
5. Pass ends of tie in front of insulator and under conductor on each side, Then around conductor on each side of insulator. Take.
6. 4 Close turns
7. 1 open turn
8. 5 Close turns
9. 1 Open turn
10. 3 Close turns

Figure B18 Tie for Shackle Insulator or Pin Insulator for Line Deviation Allowed to Specified Limit

B3.11 Insulators

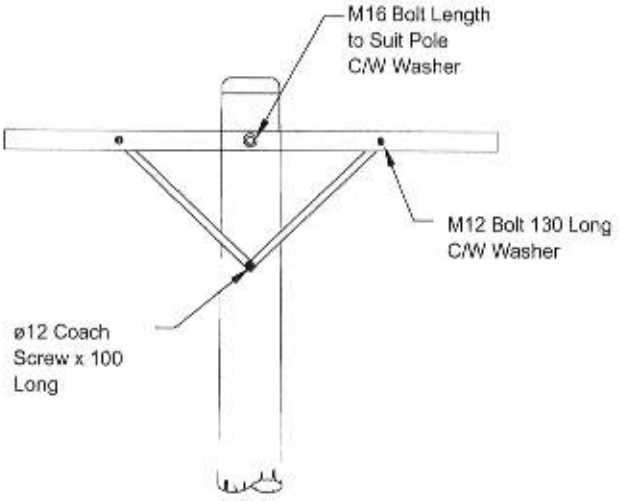
Insulators shall be of glazed porcelain or annealed glass or of any other material as may be from time to time approved by the Office of the Chief Electrical Inspector. Porcelain and glass insulators shall comply with the requirements of AS 3608.

Two types of insulators will be required for Open-Wire private construction – pin insulators and shackle insulators.

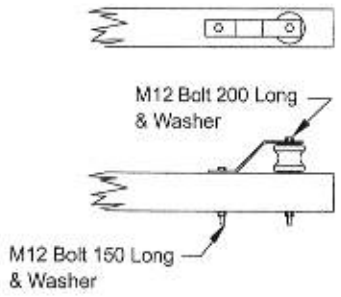
Insulators shall be fitted to crossarms and poles as shown in Figure B19. Pin Insulators should only be used at intermediate poles where either :–

- there is no deviation of the line: or
- the deviation of the line is not greater than 15°.

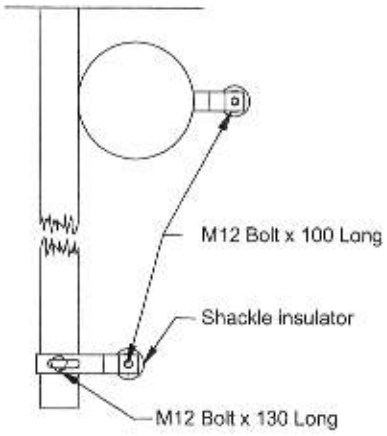
Shackle insulators shall be used at all termination poles and at all poles where the deviation of the line is greater than 15°.

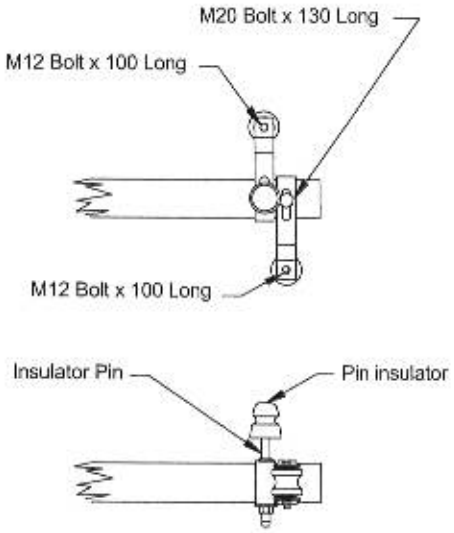


Crossarm Braces

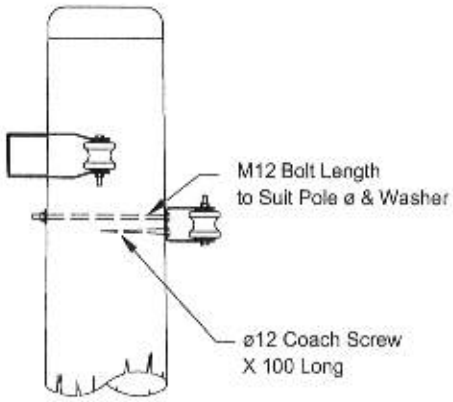


Crossarm Angle Bracket
Line Deviation





Strain Assembly Using
2 Crossarm termination Brackets



Crossarm & Pole
Termination Bracket

Notes

All bolts and washers to be Galvanised

Figure B19 Typical Hardware Installations

B3.12 Crossarms

B3.12.1 Type

Crossarms may be of suitable hardwood, steel or other suitable material. However, where steel or other conductive crossarms are used, they shall be installed in accordance with the Electricity Safety (Installations) Regulations paying particular attention to earthing requirements.

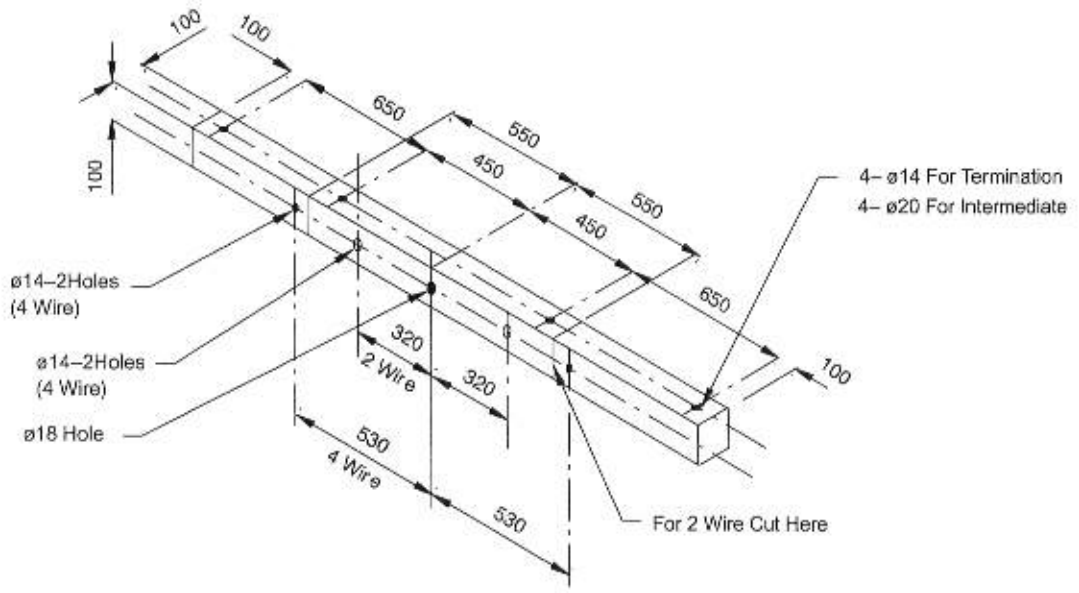
Hardwood crossarms shall have dimensions as shown in Figures B20 and B21. They shall be equipped with two suitable braces and all ferrous metals shall be galvanised or otherwise suitably protected against corrosion.

Crossarms, other than of hardwood, shall be of suitable durability and of at least equivalent strength to hardwood crossarms.

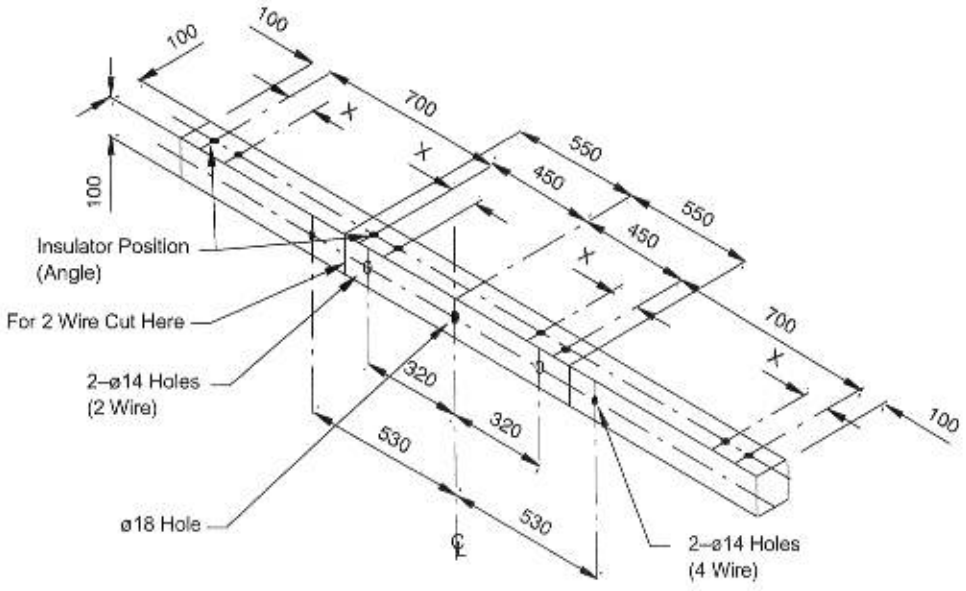
B3.12.2 Construction

Crossarms shall be drilled to provide a minimum of 600 mm spacing between conductors under all conditions of sag and sway. Figures B20 and B21 show suitable drillings for hardwood crossarms.

Crossarms shall be fitted to all poles as shown in Figures B9 to B15. Before fitting, a joggle or scarf shall be cut to a depth of about 20 mm into the true wood of the pole, and this joggle and all associated hardware shall be liberally coated with Timber Preservative Compound or a suitable class of chassis grease before fitting.



Termination or intermediate – 0° to 15° Deviation

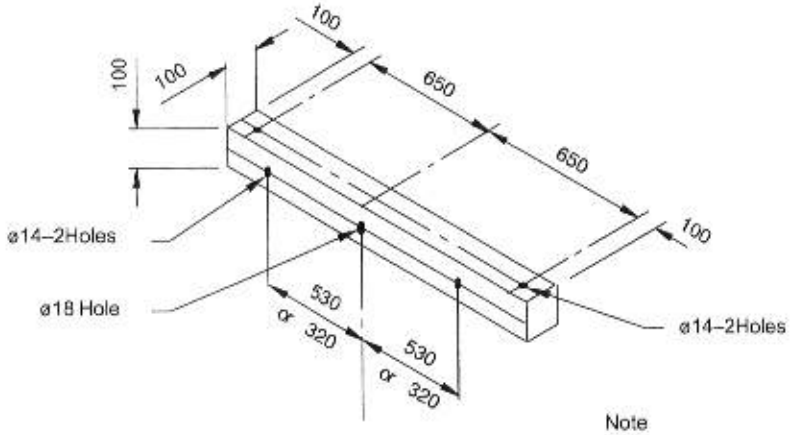


Strain or Angle –15° to 45° Deviation

X For Angle = 180

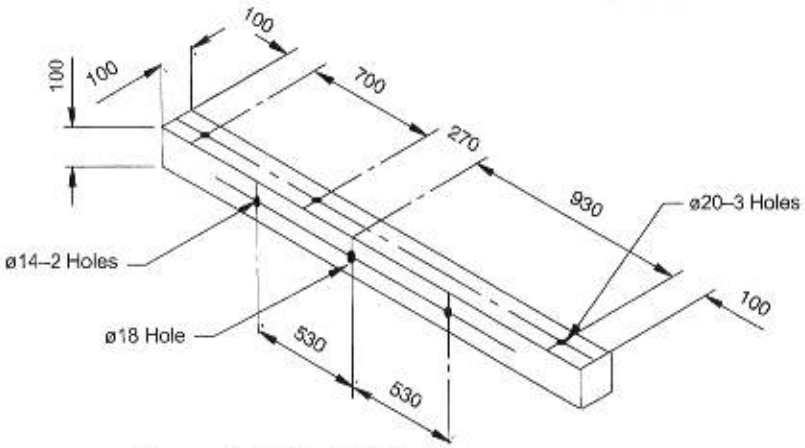
X For Strain = 50

Figure B20 2 or 4 Wire Crossarm Detail

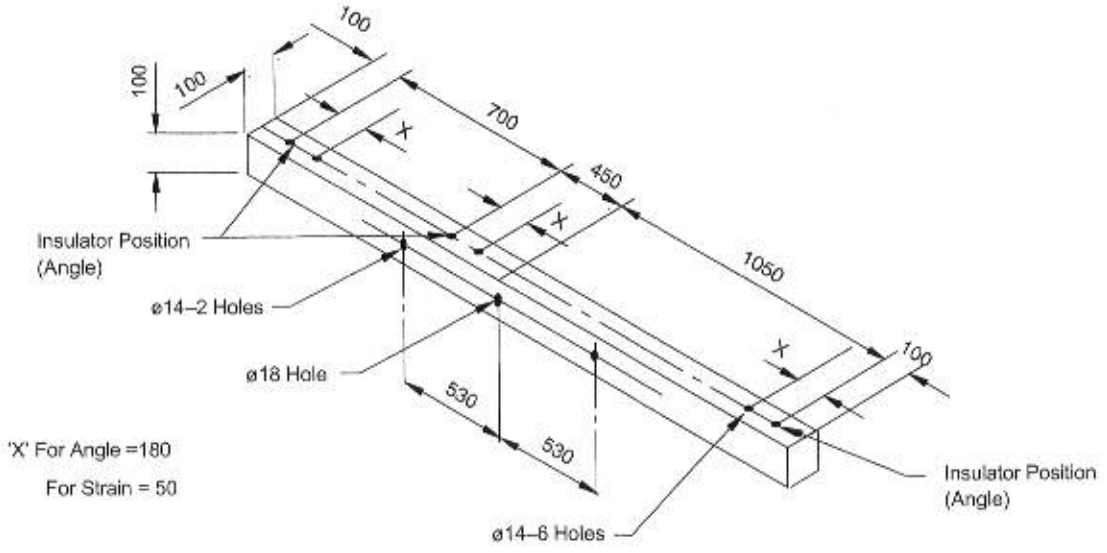


Temination Only

Note
Centre Conductor
Terminates on Pole.



Intermediate 0° – 15° Deviation



Strain or Angle 15° – 45° Deviation

Figure B21 3 Wire Crossarm Detail

Polarity Testing Guide for Supply to Electrical Installations

Reference may be made to AS 3017
"Electrical Installations – Testing Guidelines"

Important

The LEIW is responsible to ensure that all supply connections and polarities are correct after carrying out wiring work in any installation

The installation must meet the minimum insulation resistance required by the Electricity Safety (Installations) Regulations before applying the following tests:

Polarity **MUST NOT** be determined by using the earthing system or water pipes of an installation – ***an Independent Earth must be used.***

Note: If supply polarity is reversed on the supply side of an M.E.N. connection, a test at a G.P.O. (only) would not reveal the reversed polarity because the neutral and earth conductors would both be "alive". For this reason ***an Independent Earth Spike must be used.***

Object of Tests	Notes
1. To prove correct supply polarity. 2. To prove neutral conductors are continuous and connected to the supply neutral at all points.	For electrical safety – to ensure neutral bars, earth wires, water pipes and appliance frames do not become "alive".
Neutral Identification Identify all neutral connections by marking clearly.	Mark connections of neutrals on junction boxes, crossarms, bars, links etc.
Equipment Required Flexible single core insulated conductor. Independent Earth Spike. Voltage Indicator (suitable neon tube tester).	(of adequate length) (May be a 150 mm long non–insulated screwdriver) The only voltage indicators used for polarity testing should be those which do not pass a dangerous value of current.
Method of Use Push the independent earth spike as far into the ground as it will go. Connect the flexible insulated conductor to the independent earth spike and to the voltage indicator.	Keep the independent earth spike **at least 2m** clear of water pipes and earthing conductors/ electrodes.

Conduct Tests as Follows: ***Take adequate precautions to prevent electric shock.*** Have persons stand clear of metallic parts and appliances during tests. Prove the tester on a live active to ensure it is working.	To avoid persons receiving a shock if an incorrect connection has been made. A defective tester would not indicate a live conductor.
To prove all conductors are isolated from the supply. Test from independent earth spike to all conductors and test between conductors on load side of isolation point. **NO VOLTS – CORRECT**	To prove all poles are isolated from the supply.
To restore supply after wiring work/repairs. **At (each) Switchboard:** Prepare the supply conductors for testing by placing the (main) switch/es in the **OPEN** position. Disconnect the incoming neutral and (main) earth from the neutral bar or link. Ensure that neutral and earth ***do not*** touch bars or each other.	Remove circuit fuses or open MCB[S] to isolate load.
Visually check all connections before closing the supply.	The LEIW should visually check neutral markings and that all connections are correct ***before*** making conductors alive.
Close the supply and – ***At each switchboard*** 1 Test from independent earth to line side active/s. **240 VOLTS – CORRECT** 2 Test from independent earth to incoming neutral. **NO VOLTS – CORRECT** 3 Test from independent earth to main earth. **NO VOLTS – CORRECT** 4 Test from active/s to incoming neutral. **240 VOLTS – CORRECT** **Check** polyphase supply between actives. **415 or 480 VOLTS – CORRECT**	
With the supply (main) switch/es in the **OPEN** position, reconnect incoming neutral to bar.	To avoid the neutral bar being activated via load in installation.
CLOSE incoming supply and apply a load using equipment which does not require earthing. ***–correct operation of equipment OK***	To prove that neutral is continuous and not an open circuit.

Ensure Main Switch/es are **OPEN** and **CONNECT MAIN EARTH TO NEUTRAL BAR (WHERE REQUIRED).** Test from independent earth to neutral bar. **NO VOLTS – CORRECT**	M.E.N. connections must be made at Main switchboard and any distribution board where the neutral sub–main is used as an earth bonding conductor
Close Main Switch/es and **CHECK** direction of rotation of three –phase equipment if any.	To avoid damage to machinery.

SUMMARY

PURPOSE

1. **To prove correct polarity.**
2. **To prove neutral conductors are continuous and connected to neutral of the supply.**

1. **VISUALLY CHECK** the neutral connections and markings are correct.
2. **TEST** from an independent earth spike to an active.

   240 VOLTS – CORRECT

3. **TEST** from an independent earth spike to a neutral.

   NO VOLTS – CORRECT

4. **TEST** from an independent earth to a main earth.

   NO VOLTS – CORRECT

5. **TEST** between active/s and neutral

   240 VOLTS – CORRECT

Carry out the above tests at (each) switchboard and on the supply conductors.

6. **PROVE** neutral/s can carry load current
7. Restore all connections and TEST from an independent earth to a M.E.N. connection.

   NO VOLTS – CORRECT

NOTE:

Always use an independent earth spike for these tests.

Appendix D

Quality of Supply

The Quality of Supply is affected by the presence of power disturbances. The allowable limits for power disturbances in your electricity supply and those generated by your equipment are specified by the Australian Standard 2279 and AS/NZS 61000.3.

Typical causes of power disturbances may include or be caused by any of the following:

- Non Linear Load Control (e.g. variable speed motors)
- Gas discharge lighting
- Welders and arc furnaces
- Load switching
- Motor starting
- Faulty circuit connection
- Incorrect earthing practice
- Poor power factor
- Excessive voltage drop in circuit wiring

Solutions which could be introduced to reduce or eliminate power disturbances from within a customer's installation are:–

- Line filters and surge suppressors
- Isolation transformers
- Voltage regulators
- Power conditioners
- Un–interruptable power supplies (UPS)

Note:

Before implementing any such solutions, it is necessary to identify the type, frequency, magnitude and source of power disturbance.

Appendix E

Australian Standards

List of Australian Standards called up in the Service and Installation Rules –

AS 1026 – Impregnated paper insulated cables for electricity supply at working voltages up to and including 33 kV

AS 1033 – High voltage fuses (for rated voltages exceeding 1000 V)

AS 1074 – Steel tubes and tubulars for ordinary service

AS 1104 – Informative symbols for use on electrical and electronic equipment

AS 1243 – Voltage transformers for measurement and protection

AS 1329 – Methods for the analysis of zinc and zinc alloys

AS 1359 – Rotating electrical machines – General requirements

AS 1397 – Steel sheet and strip – Hot-dipped zinc-coated or aluminium/zinc coated

AS 1429.1 – Electric cables – Polymeric insulated

AS 1554 – Structural steel welding (known as the SAA Structural Steel Welding Code)

AS 1554.1 – Welding of steel structures

AS 1650 – Hot-dipped galvanized coatings on ferrous articles

AS 1675 – Current transformers – Measurement and protection

AS 1746 – Conductors – Bare overhead – Hard – drawn copper

AS 1795 – Sheets and boards for electrical purposes

AS 1824 – Insulation co-ordination (phase to earth and phase to phase, above 1 kV)

AS 1939 – Degrees of protection provided by enclosures for electrical equipment (IP Code)

AS 1977 – Flexible insulating sleeving for electrical purposes

AS 2005 – Low voltage fuses – Fuses with enclosed fuse-links

AS 2006 – High voltage a.c. switchgear and control gear – circuit breakers for rated voltages above 1000 V

AS 2053 – Non-metallic conduits and fittings

AS 2067 – Switchgear assemblies and ancillary equipment for alternating voltages above 1 kV

AS 2086 – High Voltage a.c. switchgear and control gear – metal enclosed – rated voltages above 1 kV up to and including 72.5 kV

AS 2209 – Timber Poles for overhead lines

AS 2279 – Disturbances in mains supply networks

AS 2374 – Power transformers

AS 2430 – Classification of Hazardous Areas

AS 2481 – All-or-nothing electrical relays (instantaneous and timing relays).

AS 3000 – Electrical installations – Buildings, structures and premises (known as the SAA Wiring Rules)

AS 3001 – Electrical installations – Movable premises (including caravans) and their site installations

AS 3010 – Electrical installations – Supply by generating set

AS 3012 – Electrical installations – Construction and demolition sites

AS 3017 – Electrical installations – Testing Guidelines

AS 3100 – Approval and test specification – General requirements for electrical equipment

AS 3116 – Approval and test specification – Electric cables – Elastomer insulated – For working voltages up to and including 0.6/1 kV

AS 3147 – Approval and test specification – Electric cables – Thermoplastic insulated for working voltages up to and including 0.6/1 kV

AS 3155 – Approval and test specification – Neutral screened cables for working voltages of 0.6/1 kV

AS 3187 – Approval and test specification – Mineral Insulated Metal Sheathed cables

AS 3198 – Approval and test specification – Electric cables – XLPE insulated – For working voltages up to and including 0.6/1 kV

AS 3560 – Electric cables – XLPE insulated – Aerial bundled – For working voltages up to and including 0.6/ 1kV

AS 3600 – Concrete structures

AS 3608 – Insulators – Porcelain and glass, pin and shackle type – Voltages not exceeding 1000 V a.c.

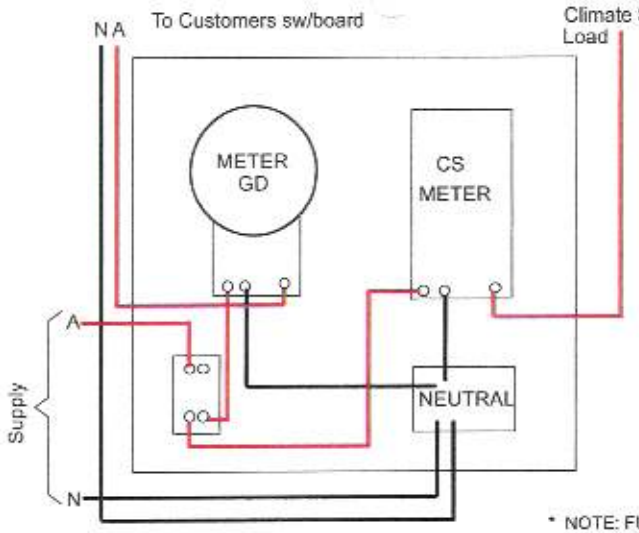
AS 3609 – Insulators – Porcelain stay type – Voltages greater than 1000 V a.c.

AS 6002 – Domestic Electricity Metering Enclosures.

AS/NZS 61000.3 – Electromagnetic Compatibility (EMC) – Limits.

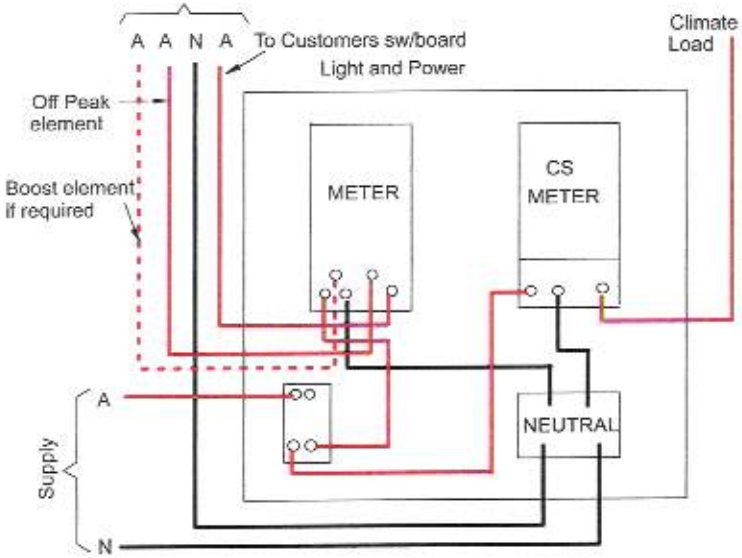
Note:—The Australian Standards referred to above shall be taken to be the latest revision, including amendments at the time of carrying out the installation.

Powercor Australia's Specific Requirements

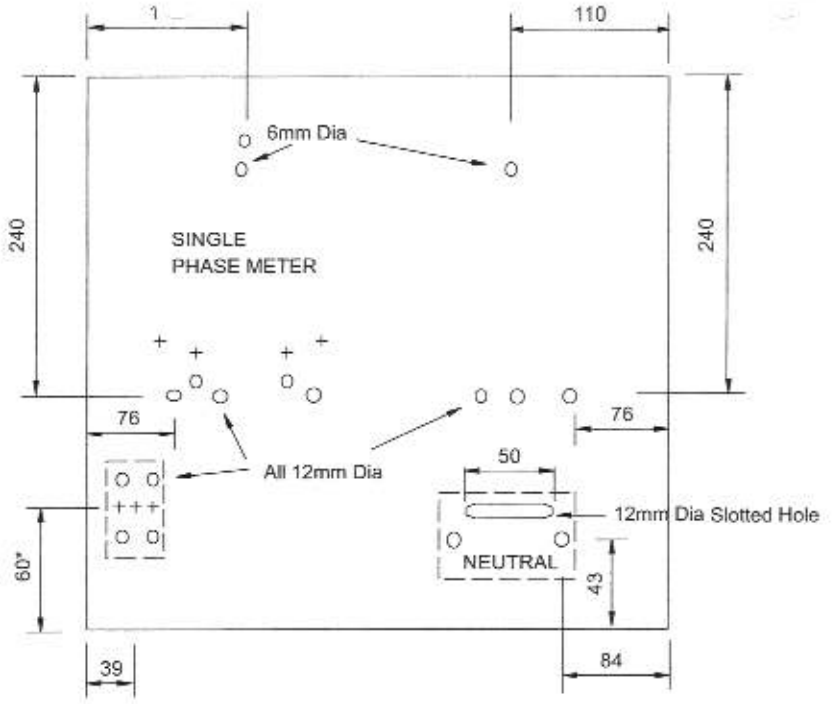


WIRING DIAGRAM WITH CLIMATE SAVER METER

* NOTE: FUSE CENTRELINE RELOCATED TO 60mm TO ALLOW METER TERMINAL COVER CLEARANCE



WIRING DIAGRAM WITH OFF PEAK LOAD (ELECTRONIC METER) & CLIMATE SAVER METER



NOTE: ALL HOLES 3mm DIA UNLESS OTHERWISE SHOWN

METER PANEL LAYOUT

CLIMATE SAVER DIAGRAMS – POWERCOR AUSTRALIA

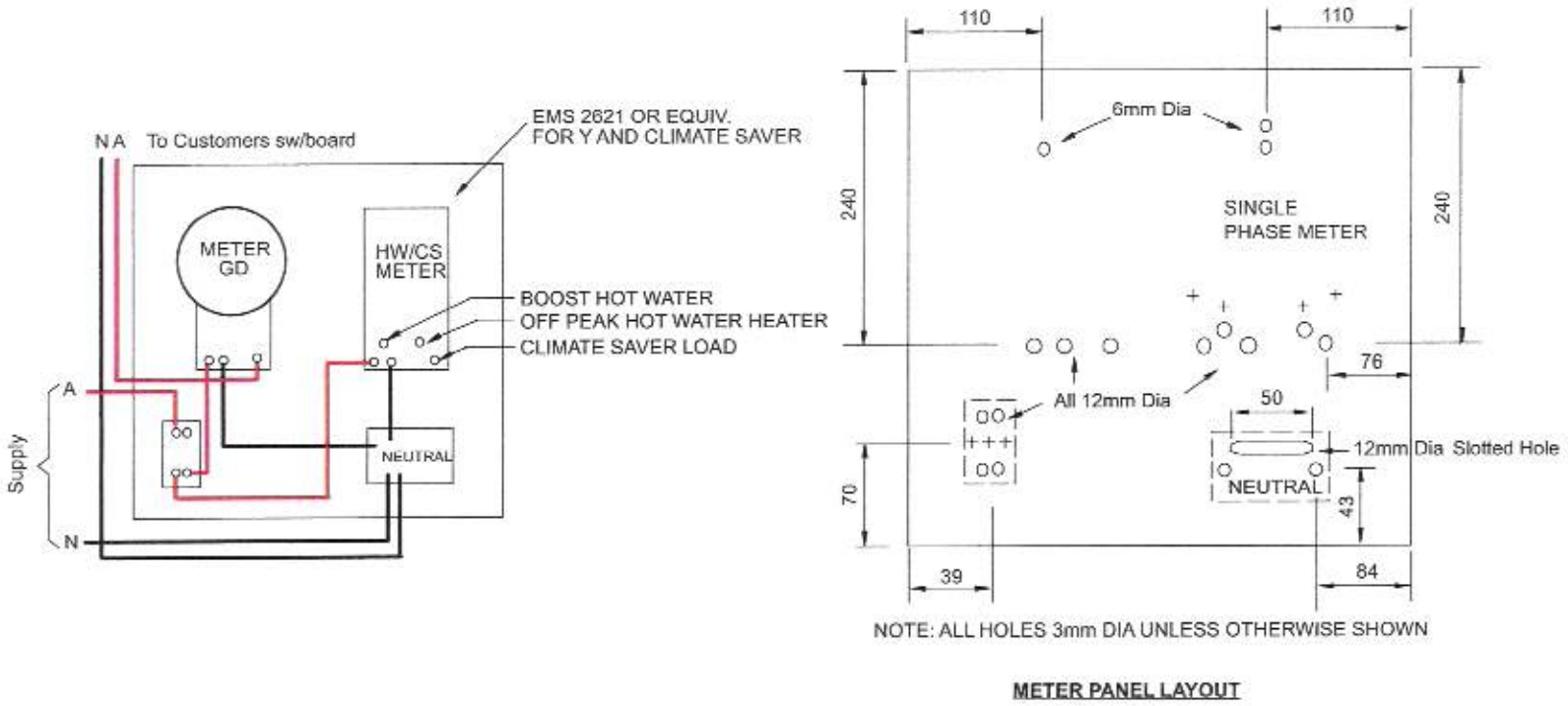
TYPICAL METERING DETAILS FOR ONE CUSTOMER SINGLE PHASE WITH OR WITHOUT OFF PEAK LOAD & CLIMATE SAVER LOAD

MAXIMUM 16mm^2 CONDUCTORS
PANEL SIZE 400mm W x 380mm H

Notes

1. Meter panel fuse is not required for an overhead supply.
2. All metering neutrals minimum 2.5mm^2 stranded conductors.

Figure F1



METER PANEL LAYOUT

CLIMATE SAVER DIAGRAMS – POWERCOR AUSTRALIA

TYPICAL METERING DETAILS FOR ONE CUSTOMER
SINGLE PHASE WITH MECHANICAL METER
OFF PEAK LOAD & CLIMATE SAVER COMBINED
ELECTRONIC METER

MAXIMUM 16mm^2 CONDUCTORS
PANEL SIZE 400mm W x 380mm H

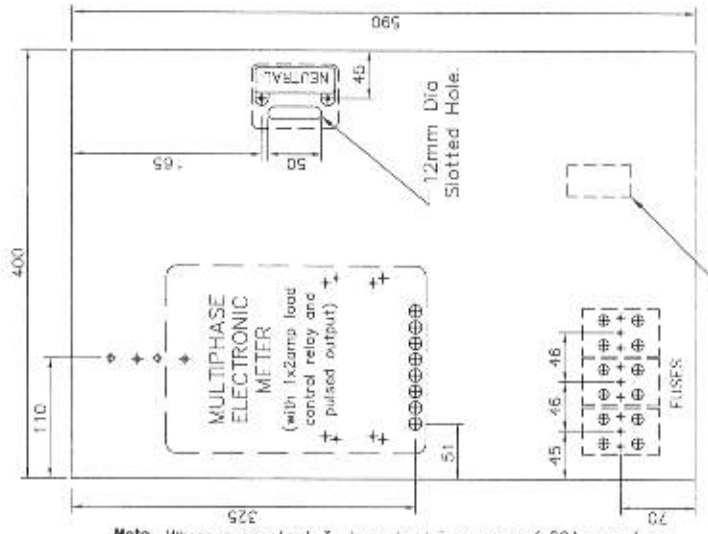
Notes

1. Meter panel fuse is not required for an overhead supply.
2. All metering neutrals minimum 2.5mm^2 stranded conductors.

Figure F2

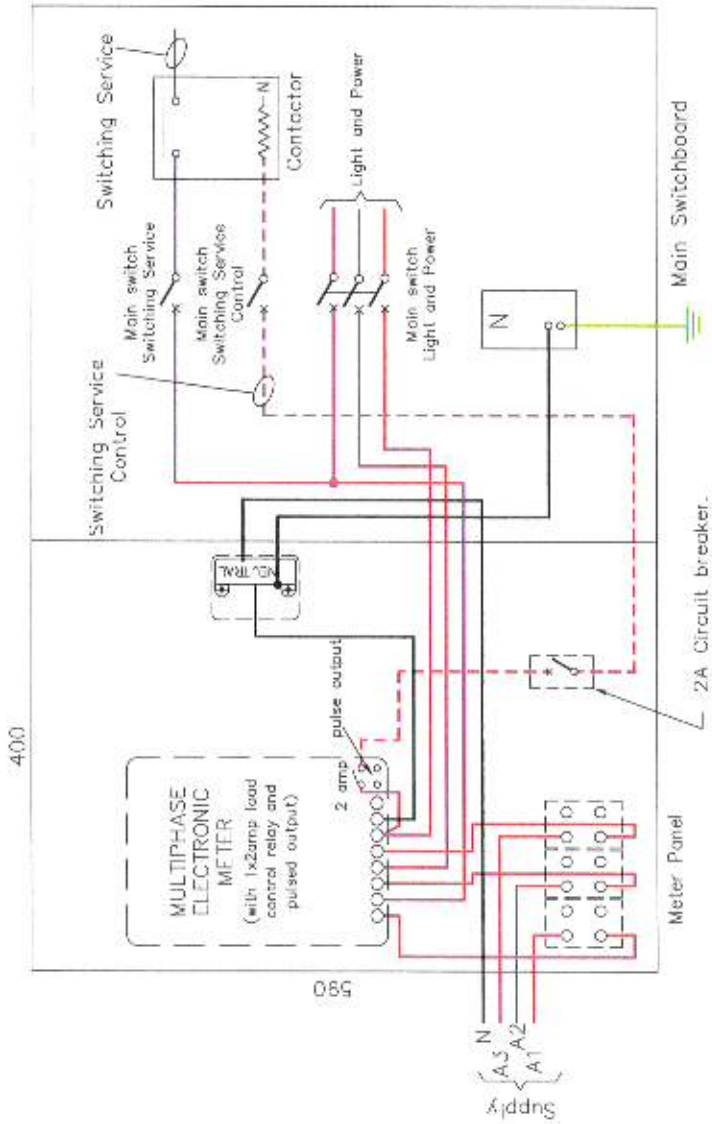
Appendix G

TXU Australia's Specific Requirements



Note Where a constant 3 phase load in excess of 60A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.

TYPICAL METER PANEL LAYOUT
PANEL SIZE 400mm W x 590mm H
1 CUSTOMER
MULTIPHASE 1 or 2 RATE

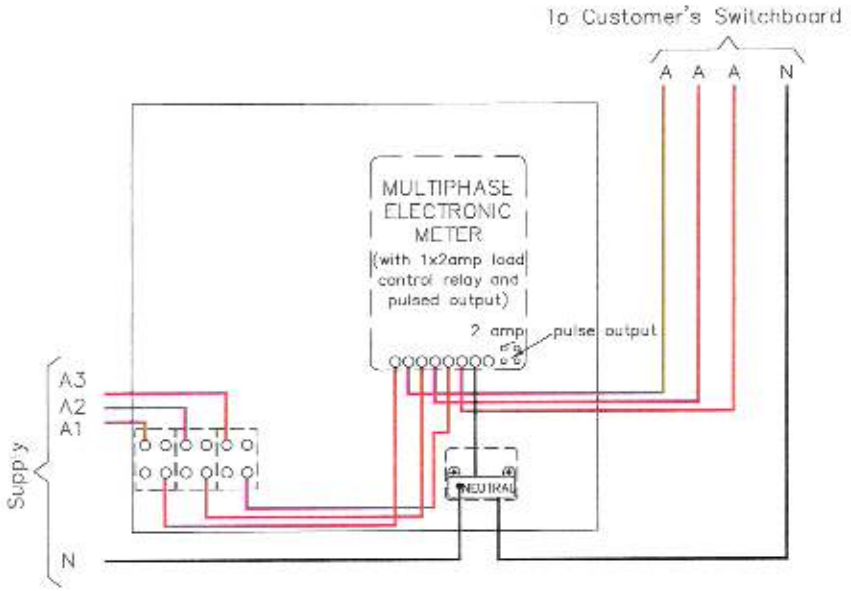


WIRING DIAGRAM
MULTI PHASE SUPPLY
USING MULTIPHASE ELECTRONIC METER

Notes

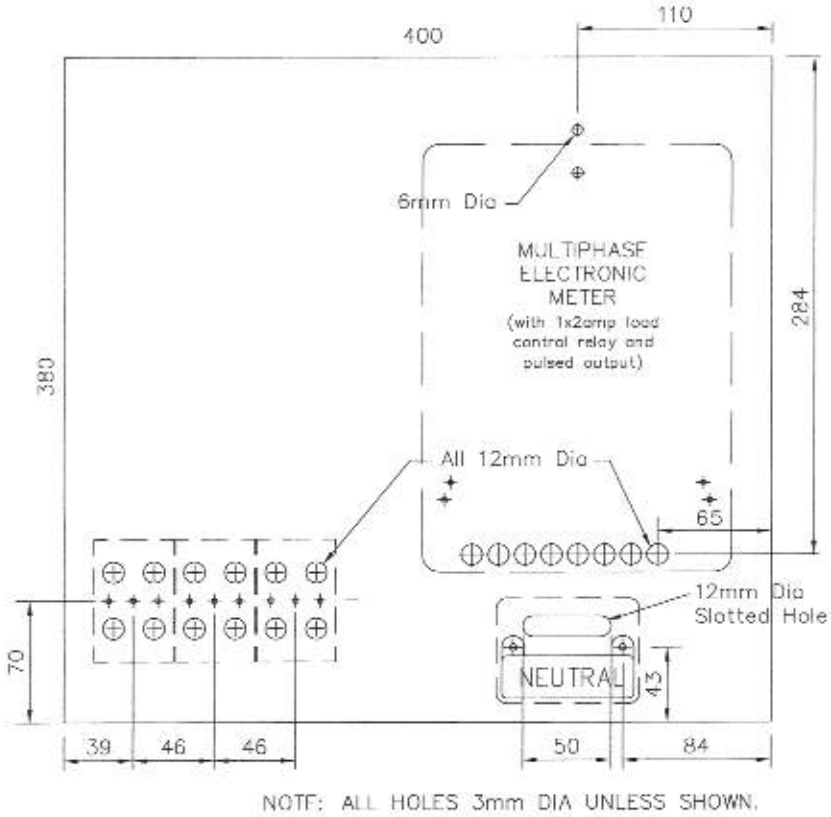
1. Meter panel fuses are not required for an overhead supply.
2. All metering neutrals to be a minimum of 2.5 mm² stranded conductors. Refer to Clause 6.6.2 for load carrying conductors.
3. Contactor coils 240V.
4. Maximum load for multiphase meter contacts 2A.
5. Cables marked thus - - - - shall be 2.5 mm² stranded conductors. Where meter panel and main switchboard is in the same enclosure, 2A circuit breaker on meter panel is not required. Where meter panel is remote from the main switchboard, the conductors shall be protected by a 2A circuit breaker as shown.

Figure G1 TYPICAL ARRANGEMENT FOR CUSTOMER'S SWITCHING SERVICE
MULTIPHASE METERING DIAGRAMS - TXU AUSTRALIA



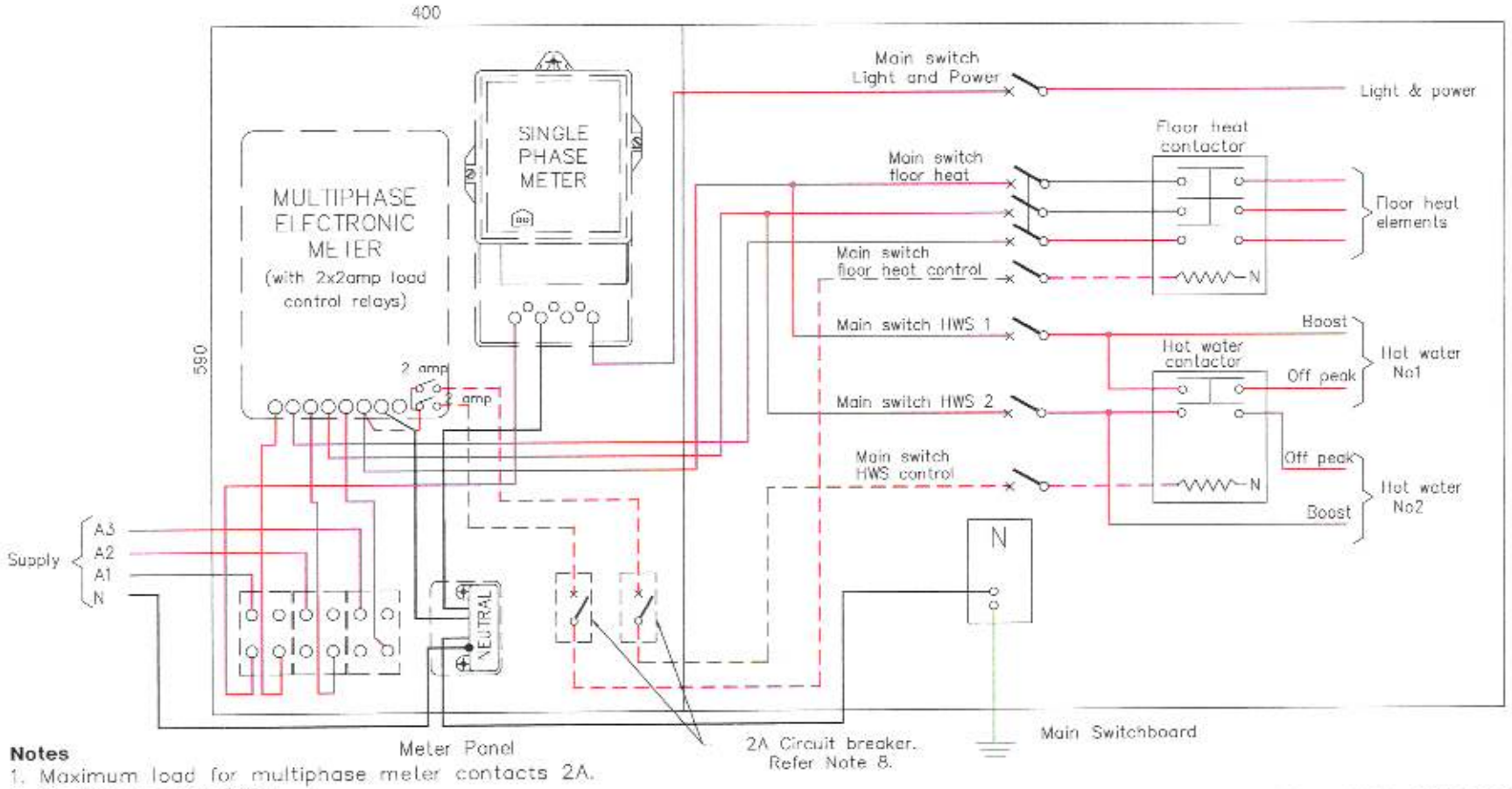
WIRING DIAGRAM
MULTIPHASE ELECTRONIC METER

Notes
1. Meter panel fuses are not required for an overhead supply.
2. All metering neutrals to be a minimum of 2.5 mm² stranded conductors.
3. Refer to Fig. 6.32 for meter templates.
4. Refer to Table 6.1 for conductor size limitations.
5. Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.



TYPICAL METER PANEL LAYOUT
PANEL SIZE 400mm W x 380mm H

MULTIPHASE METERING DIAGRAMS - TXU AUSTRALIA
Figure G2 TYPICAL METERING DETAILS FOR ONE CUSTOMER MULTIPHASE 1 or 2 RATE

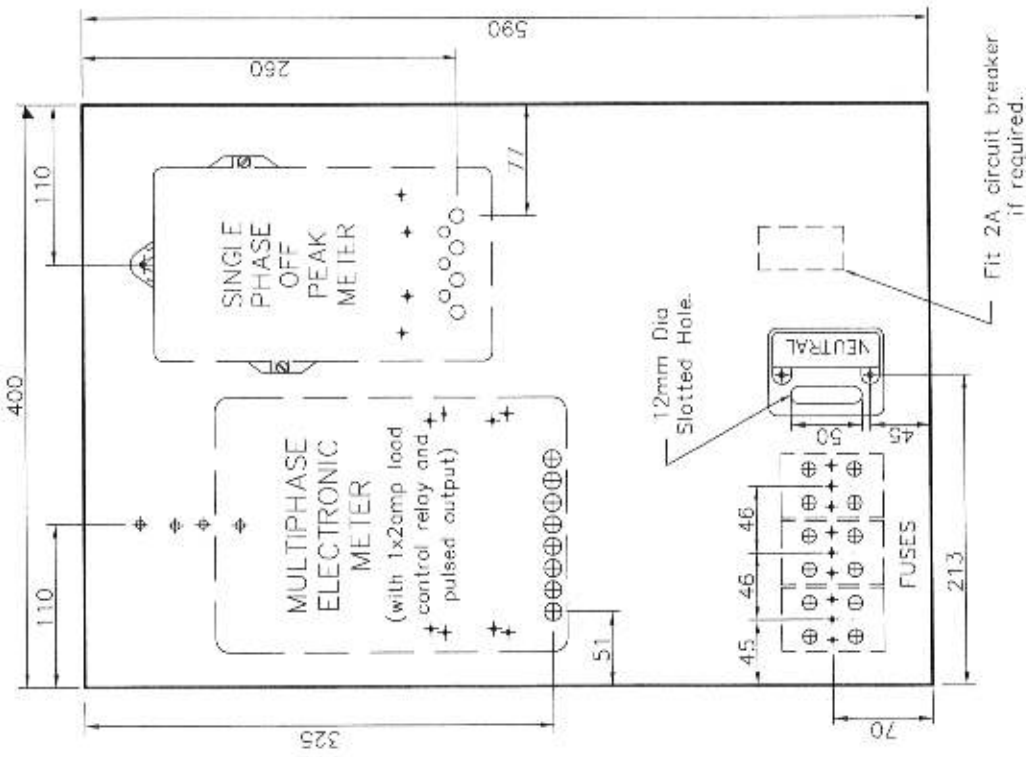


Notes

1. Maximum load for multiphase meter contacts 2A.
2. Contactor coils 240V.
3. For clarity, control thermostats not shown.
4. All metering neutrals minimum 2.5 mm² stranded conductors. Refer to Clause 6.6.2 for load carrying conductors.
5. Meter panel fuses are not required for an overhead supply.
6. Refer Clause 4.8.2 re Balancing of Load.
7. Refer to Table 6.1 for conductor size limitations.
8. Cables marked thus – – – – shall be 2.5 mm² stranded conductors. Where meter panel and main switchboard are in same enclosure, 2A circuit breakers on meter panel are not required. Where meter panel is remote from the main switchboard, the conductors shall be protected by a 2A circuit breaker as shown.
9. Refer to Figure G3.1 for "TYPICAL METER PANEL LAYOUT".

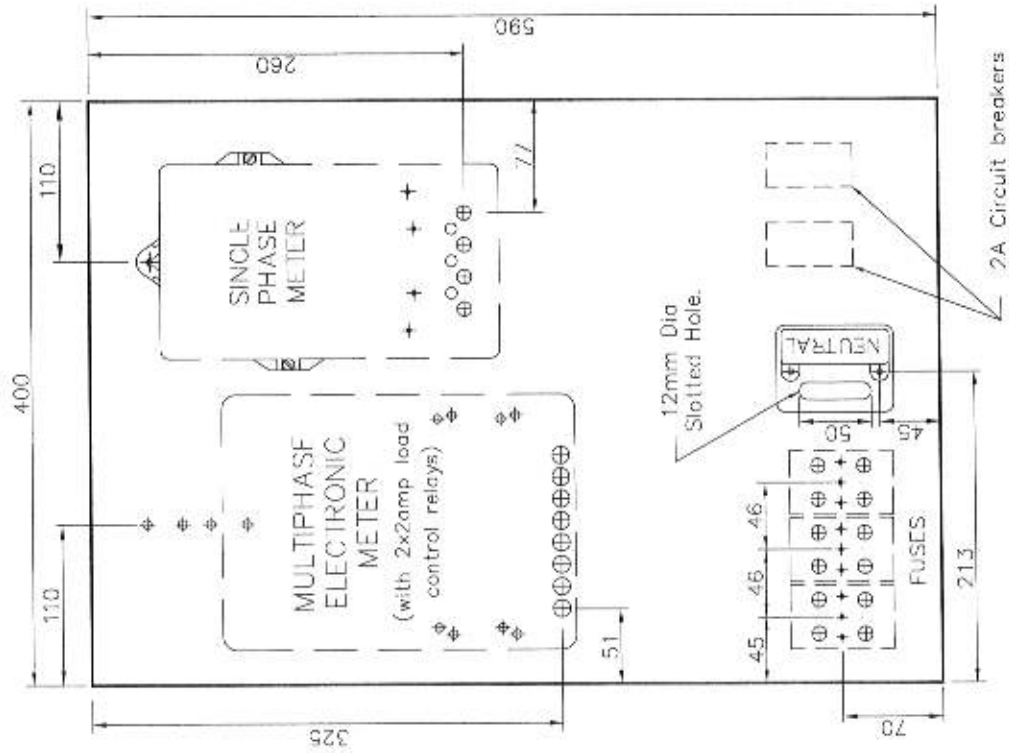
MULTIPHASE METERING DIAGRAMS - TXU AUSTRALIA
TYPICAL WIRING DIAGRAM FOR MULTIPHASE FLOOR HEATING AND TWO TWIN ELEMENT OFF PEAK HOT WATER SERVICES.
PANEL SIZE 400mm W x 590mm H

Figure G3.0



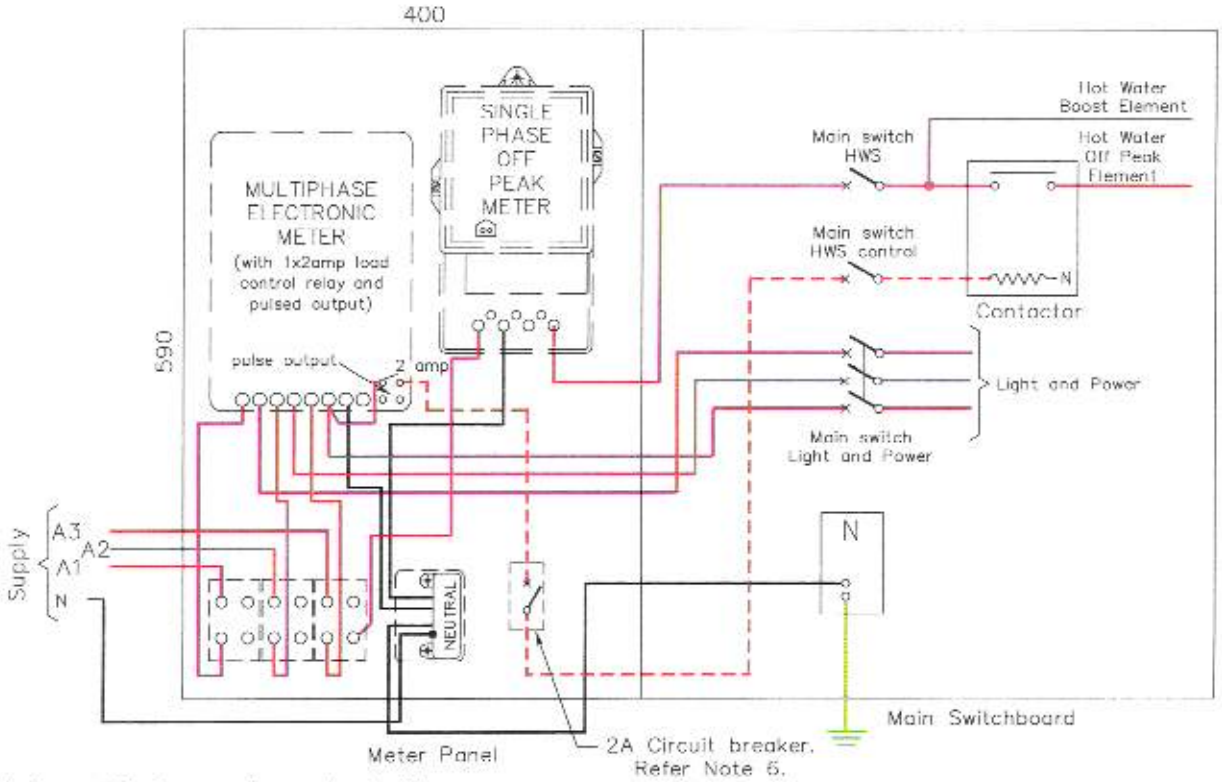
TYPICAL METER PANEL VERTICAL LAYOUT
PANEL SIZE 400mm W x 590mm H
1 CUSTOMER
MULTIPHASE WINNER WITH OFF PEAK LOADS
(Refer Figure G4.0 for "WIRING DIAGRAM")

Note Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.



TYPICAL METER PANEL LAYOUT
PANEL SIZE 400mm W x 590mm H
1 CUSTOMER
MULTIPHASE TWO OFF PEAK LOADS
(Refer Figure G3.0 for "WIRING DIAGRAM")

Figure G3.1

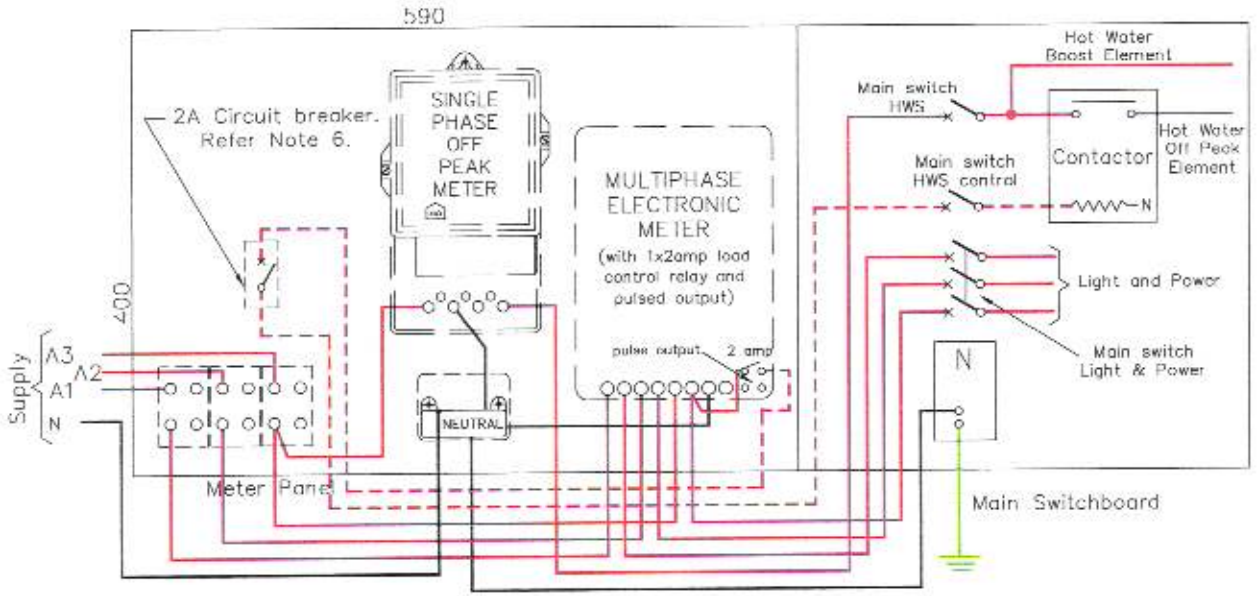


Notes

1. Maximum load for multi phase meter contacts 2A.
2. Meter panel fuses are not required for an overhead supply.
3. All metering neutrals min. 2.5mm² stranded conductors. Refer to Clause 6.6.2 for load carrying conductors.
4. Refer to Table 6.1 for conductor size limitations.
5. Contactor coils 240V.
6. Cables marked thus - - - - shall be 2.5 mm² stranded conductors. Where meter panel and main switchboard is in the same enclosure, 2A circuit breaker on meter panel is not required. Where meter panel is remote from the main switchboard, the conductors shall be protected by a 2A circuit breaker as shown.
7. Refer to Figure G3.1 for "TYPICAL METER PANEL LAYOUT".

WIRING DIAGRAM
MULTIPHASE WINNER WITH OFF PEAK LOAD
USING MULTIPHASE ELECTRONIC METER

MULTIPHASE METERING DIAGRAMS - TXU AUSTRALIA
Figure G4.0 TYPICAL VERTICAL ARRANGEMENT FOR 1 CUSTOMER
MULTIPHASE WINNER WITH OFF PEAK LOAD



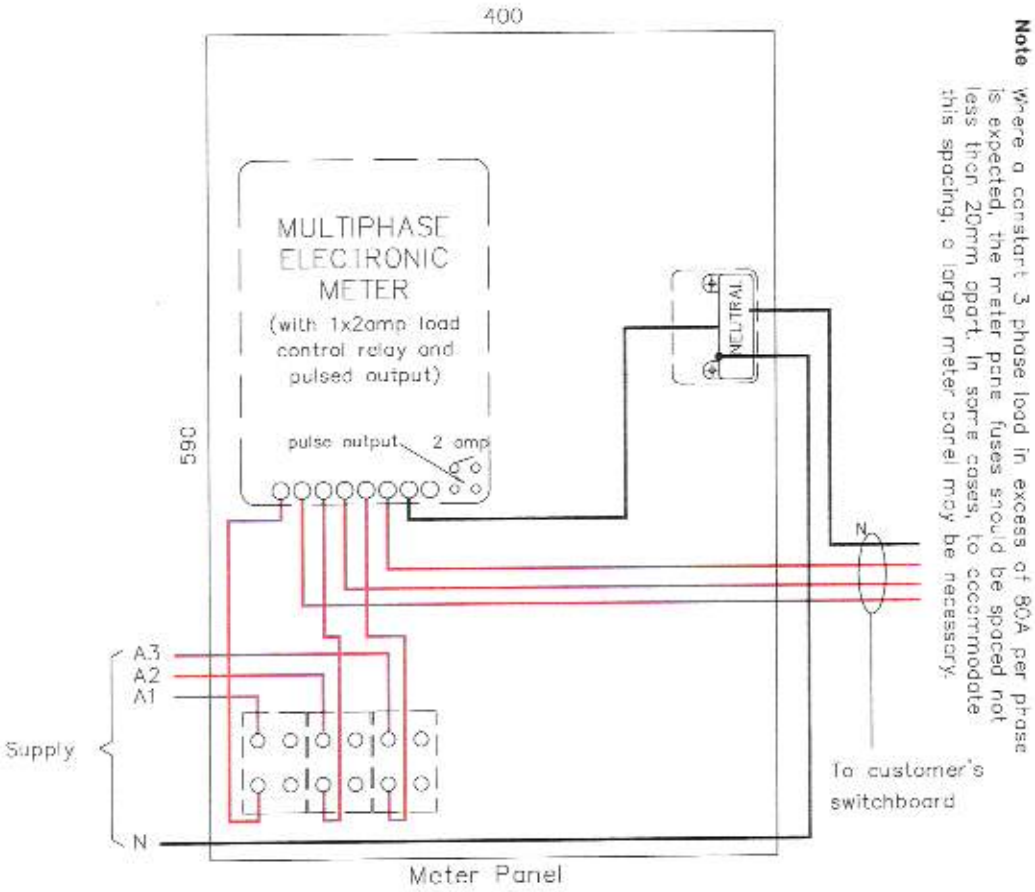
Notes

1. Maximum load for multi phase meter contacts 2A. For switching loads exceeding 30A refer Fig. 6.21
2. Meter panel fuses are not required for an overhead supply.
3. All metering neutrals min. 2.5mm² stranded conductors. Refer to Clause 6.6.2 for load carrying conductors.
4. Refer to Table 6.1 for conductor size limitations.
5. Contactor coils 240V.
6. Cables marked thus - - - - shall be 2.5 mm² stranded conductors. Where meter panel and main switchboard is in the same enclosure, 2A circuit breaker on meter panel is not required. Where meter panel is remote from the main switchboard, the conductors shall be protected by a 2A circuit breaker as shown.
7. Refer to Figure G6.1 for "TYPICAL METER PANEL LAYOUT".

WIRING DIAGRAM
MULTIPHASE WINNER WITH OFF PEAK LOAD
USING MULTIPHASE ELECTRONIC METER

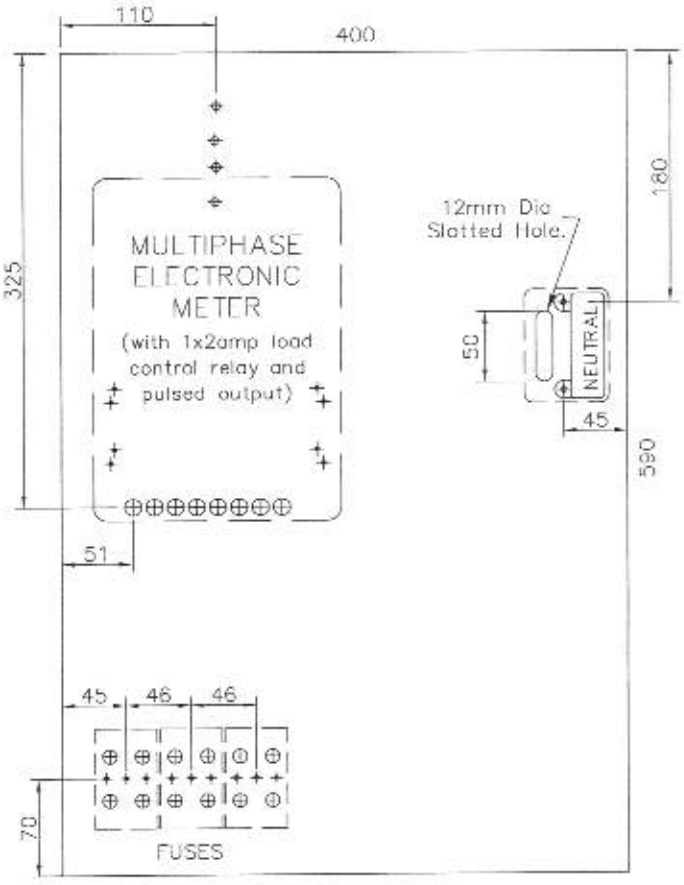
MULTIPHASE METERING DIAGRAMS - TXU AUSTRALIA

Figure G4.1 TYPICAL HORIZONTAL ARRANGEMENT FOR 1 CUSTOMER MULTIPHASE WINNER WITH OFF PEAK LOAD



Note Where a constant 3 phase load in excess of 80A per phase is expected, the meter pans fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.

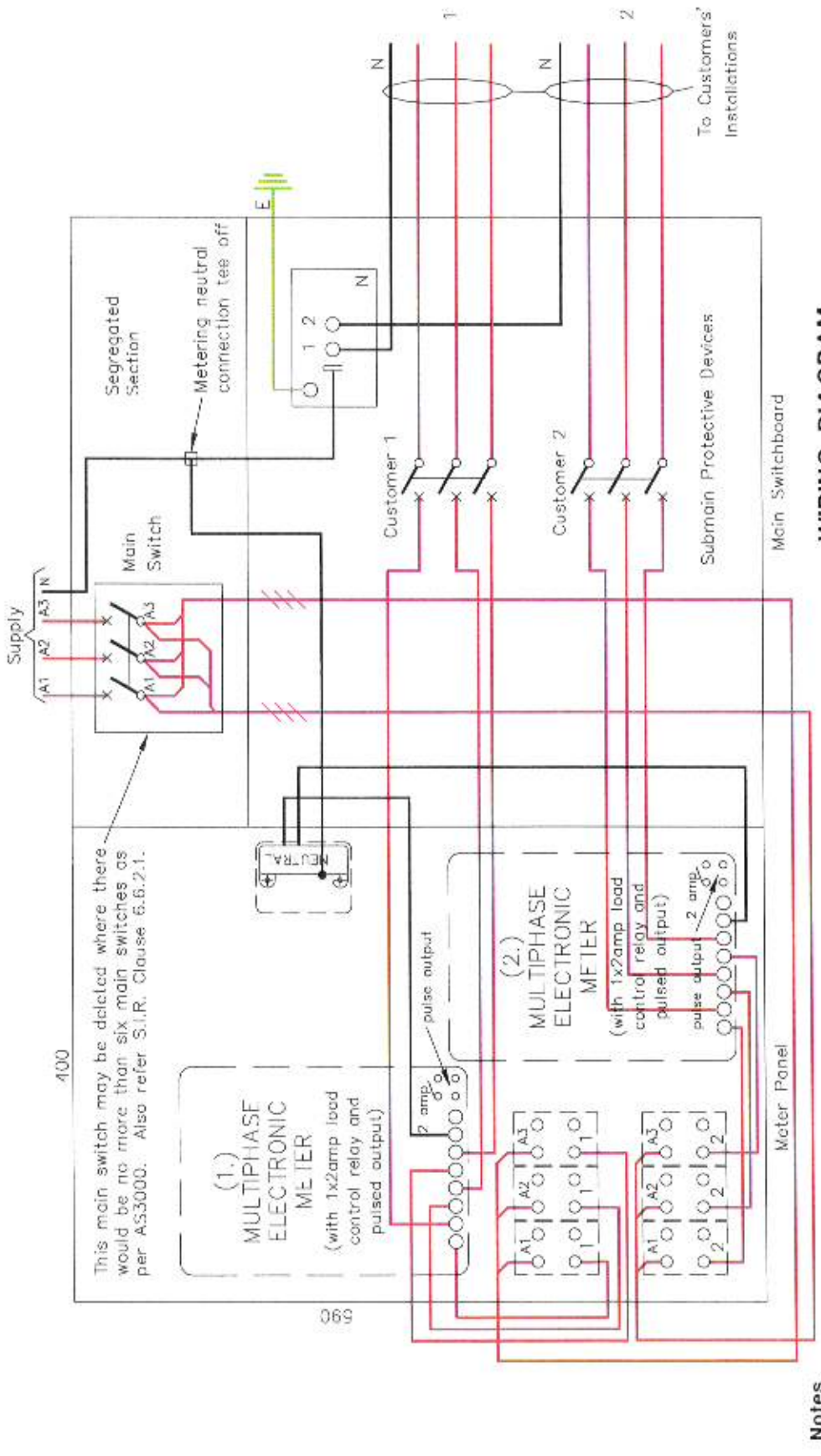
WIRING DIAGRAM
MULTIPHASE ELECTRONIC METER



TYPICAL METER PANEL LAYOUT
PANEL SIZE 400mm W x 590mm H

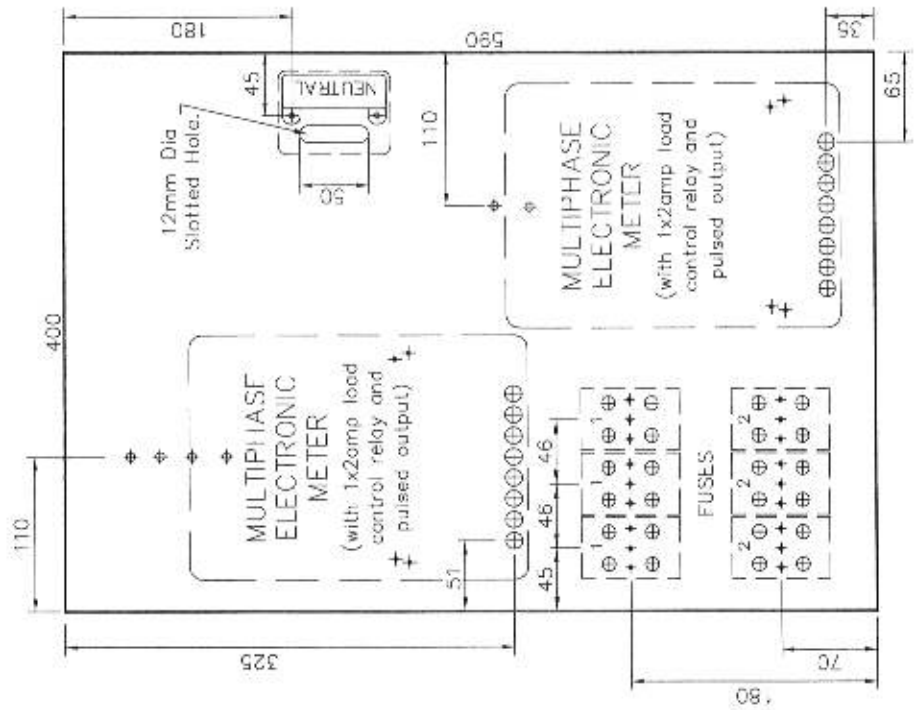
Notes
1. Meter panel fuses are not required for an overhead supply.
2. All metering neutrals min. 2.5mm² stranded conductors.
3. Refer to Table 6.1 for conductor size limitations.

MULTIPHASE METERING DIAGRAMS - TXU AUSTRALIA
Figure G5 TYPICAL ARRANGEMENT FOR 1 CUSTOMER MULTIPHASE FOR 1 or 2 RATE



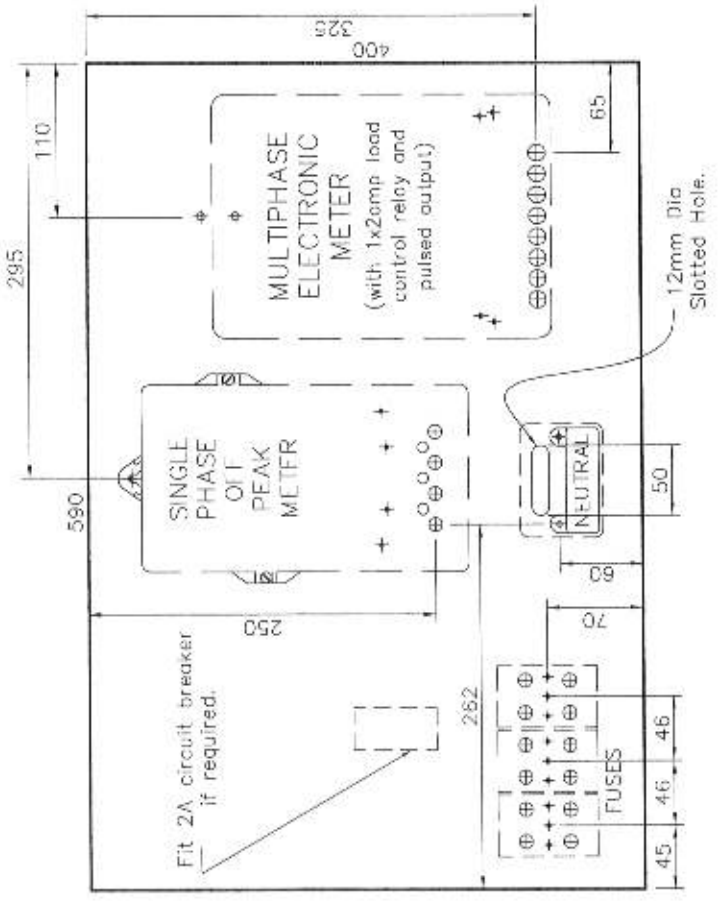
WIRING DIAGRAM
MULTIPHASE ELECTRONIC METER
PANEL SIZE 400mm W x 590mm H
MULTIPHASE METERING DIAGRAMS - TXU AUSTRALIA
Figure G6.0 TYPICAL ARRANGEMENT FOR 2 CUSTOMERS
MULTIPHASE 1 or 2 RATE

Notes
1. All metering neutrals min. 2.5mm² stranded conductors.
2. Refer to Table 6.1 for conductor size limitations.
3. Refer to Figure G6.1 for "TYPICAL MFTER PANEL LAYOUT".



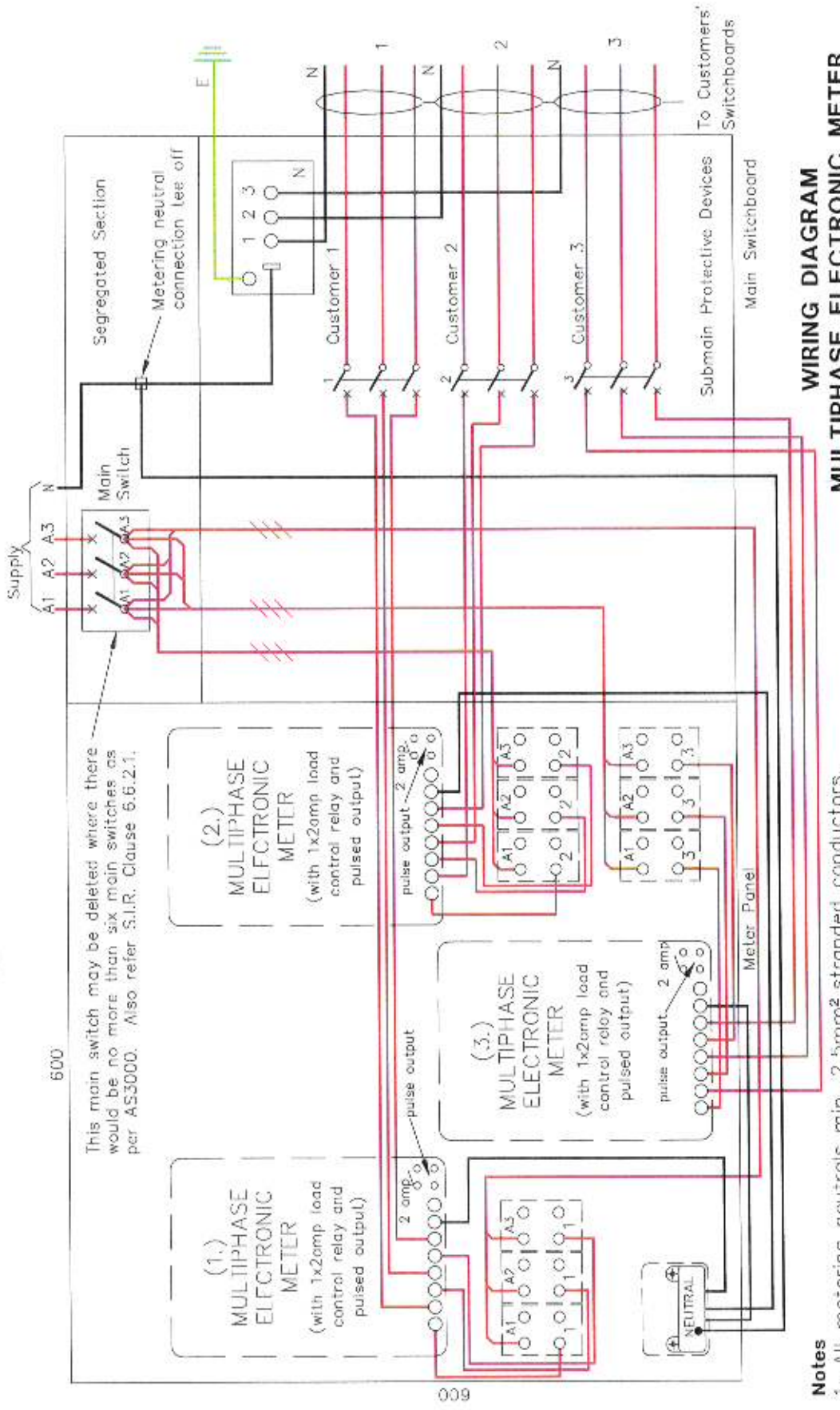
TYPICAL METER PANEL LAYOUT
2 CUSTOMERS
MULTIPHASE 1 or 2 RATE
(Refer Figure G6.0 for "WIRING DIAGRAM")

Note Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.



TYPICAL METER PANEL HORIZONTAL LAYOUT
PANEL SIZE 400mm W x 590mm H
1 CUSTOMER
MULTIPHASE WINNER WITH OFF PEAK LOADS
(Refer Figure G4.1 for "WIRING DIAGRAM")

Figure G6.1



WIRING DIAGRAM
MULTIPHASE ELECTRONIC METER
PANEL SIZE 600mm W x 600mm H

MULTIPHASE METERING DIAGRAMS - TXU AUSTRALIA
Figure G7.0 TYPICAL ARRANGEMENT FOR 3 CUSTOMERS
MULTIPHASE 1 or 2 RATE

Notes
1. All metering neutrals min. 2.5mm² stranded conductors.
2. Refer to Table 6.1 for conductor size limitations.
3. Refer to Figure G7.1 for "TYPICAL METER PANEL LAYOUT".

Note Where a constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.

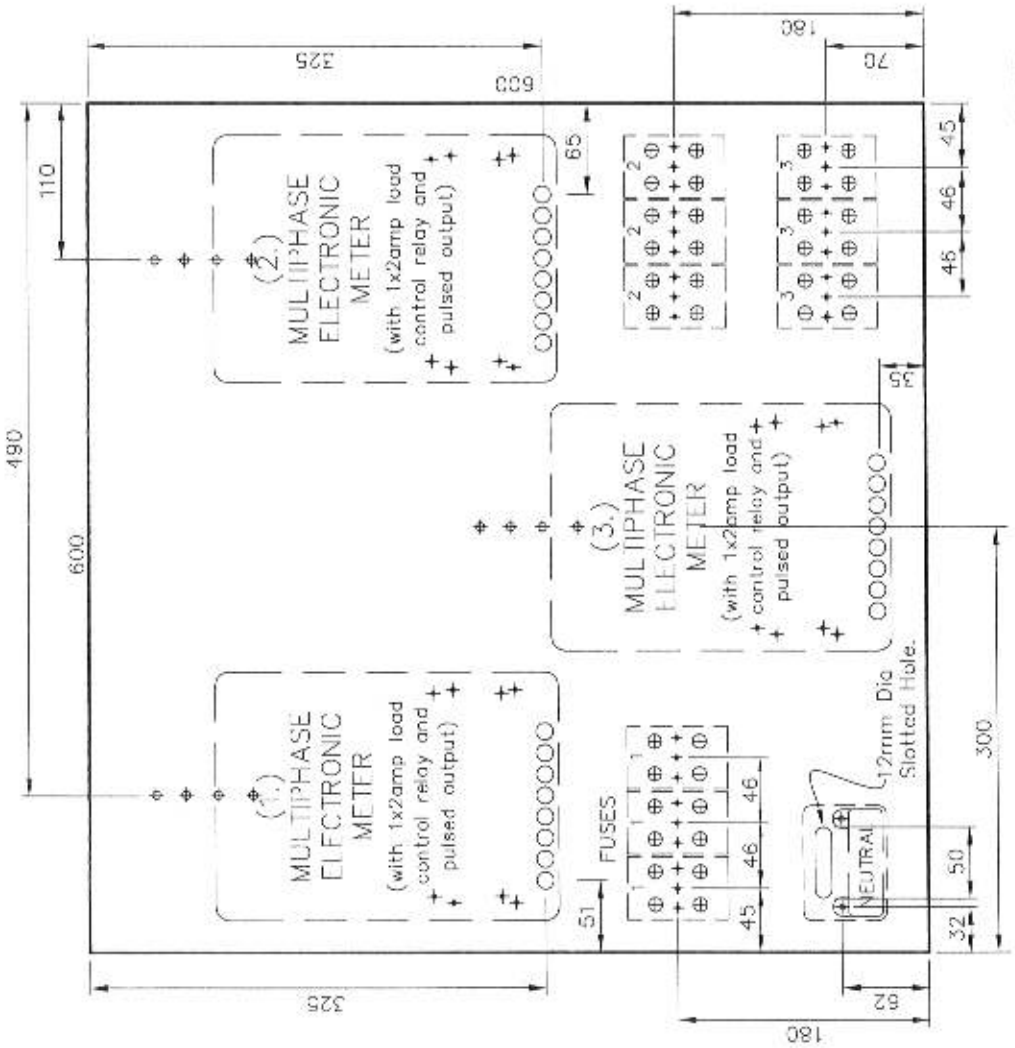


Figure G7.1 TYPICAL METER PANEL LAYOUT
3 CUSTOMERS
MULTIPHASE 1 or 2 RATE
(Refer Figure G7.0 for "WIRING DIAGRAM")

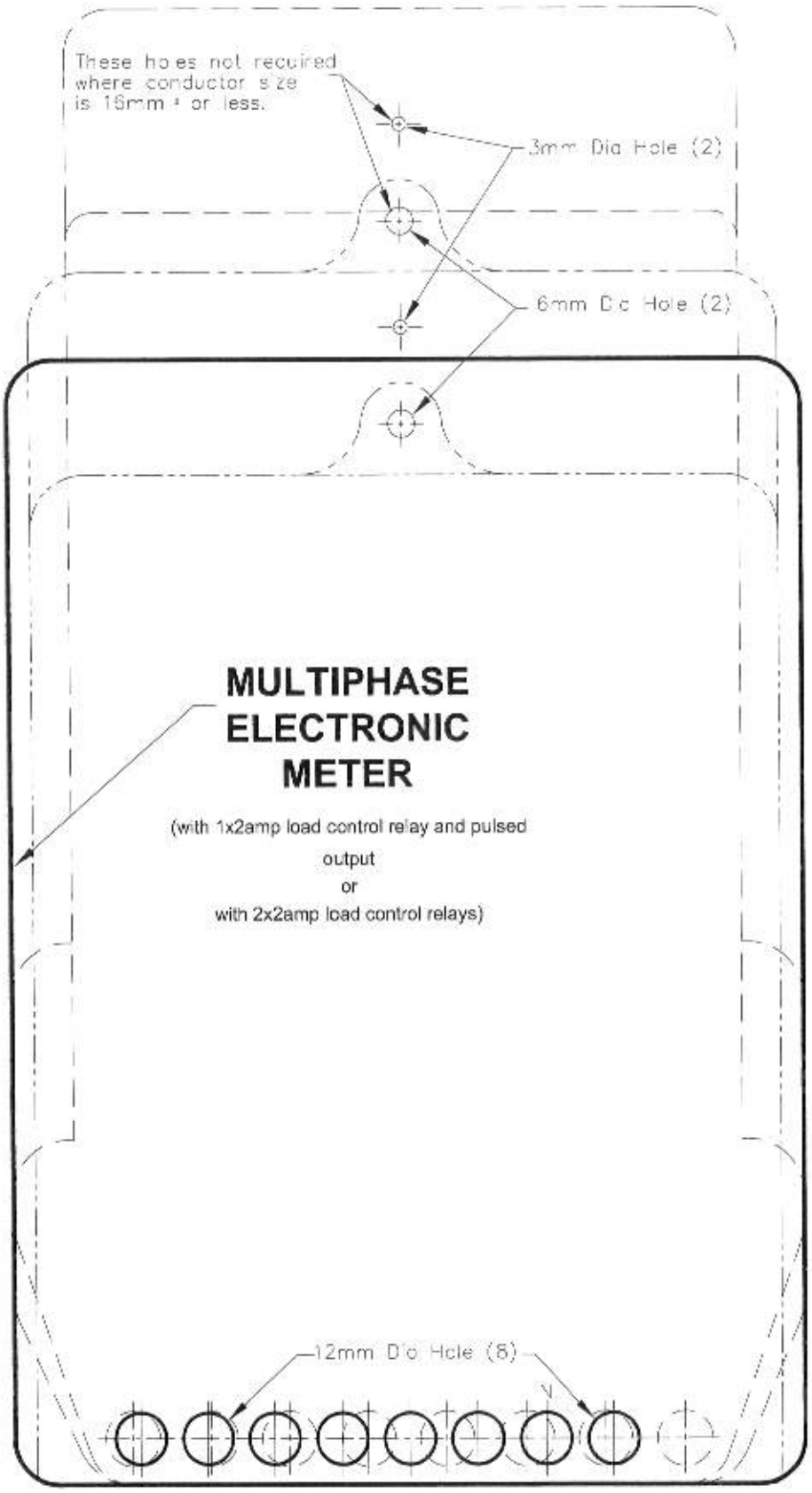


Figure G8 Multiphase Meter Drilling Template

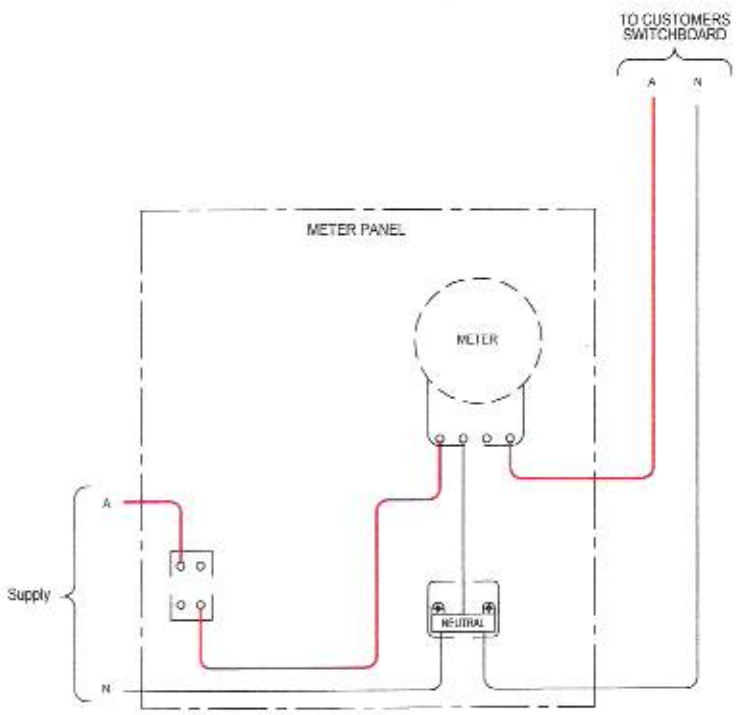
NOTE (FOR COMPARISON PURPOSES):

In the above illustration features shown in dotted or broken lines represent previous meters used.

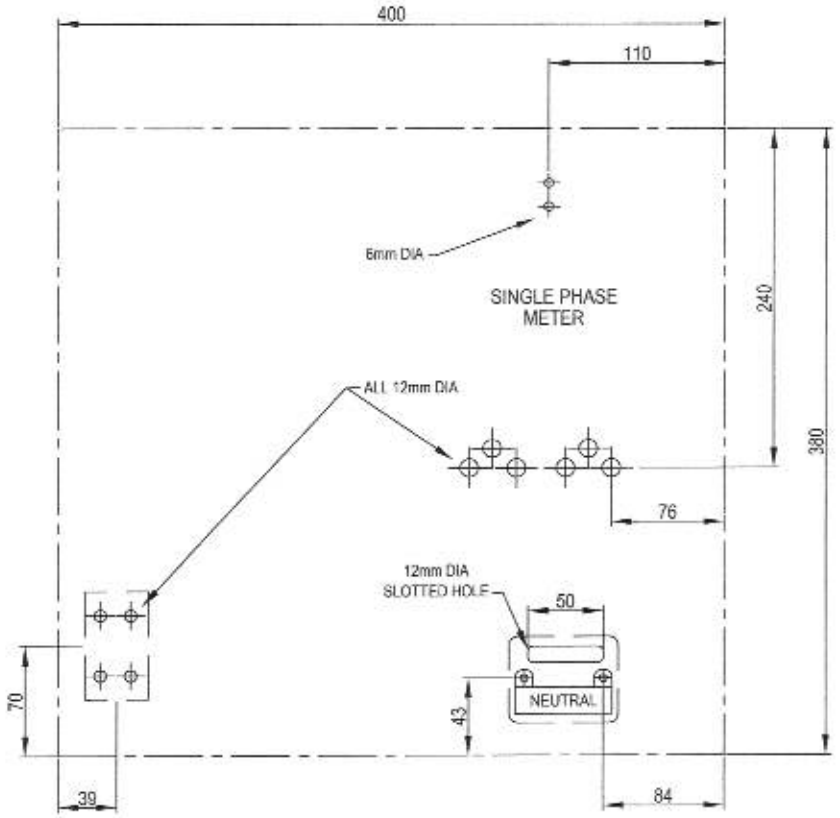
Appendix H

Alinta/United Energy Specific Requirements

ALINTA / UNITED ENERGY STANDARD BASIC METER (SUITABLE FOR TYPE 6)



WIRING DIAGRAM



NOTE - ALL HOLE 3mm DIA UNLESS OTHERWISE SHOWN

METER PANEL LAYOUT

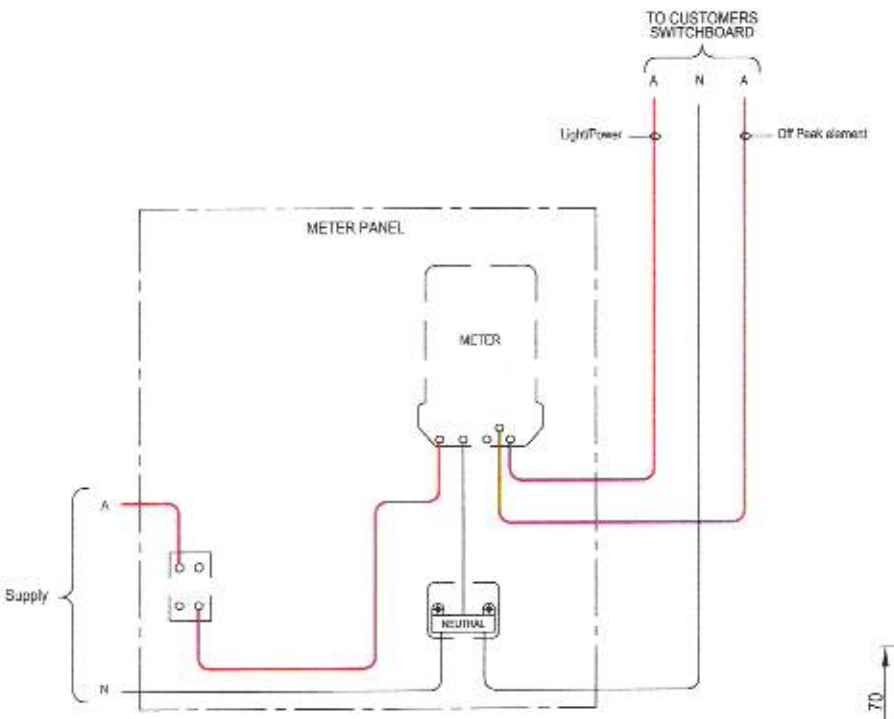
Notes:

1. Meter panel fuse is not required for an overhead supply.
2. All metering neutrals to be 4mm2 minimum stranded conductors.
3. Refer to Fig. 6.31 for meter template.
4. Refer to Table 6.1 for conductor size limitations.

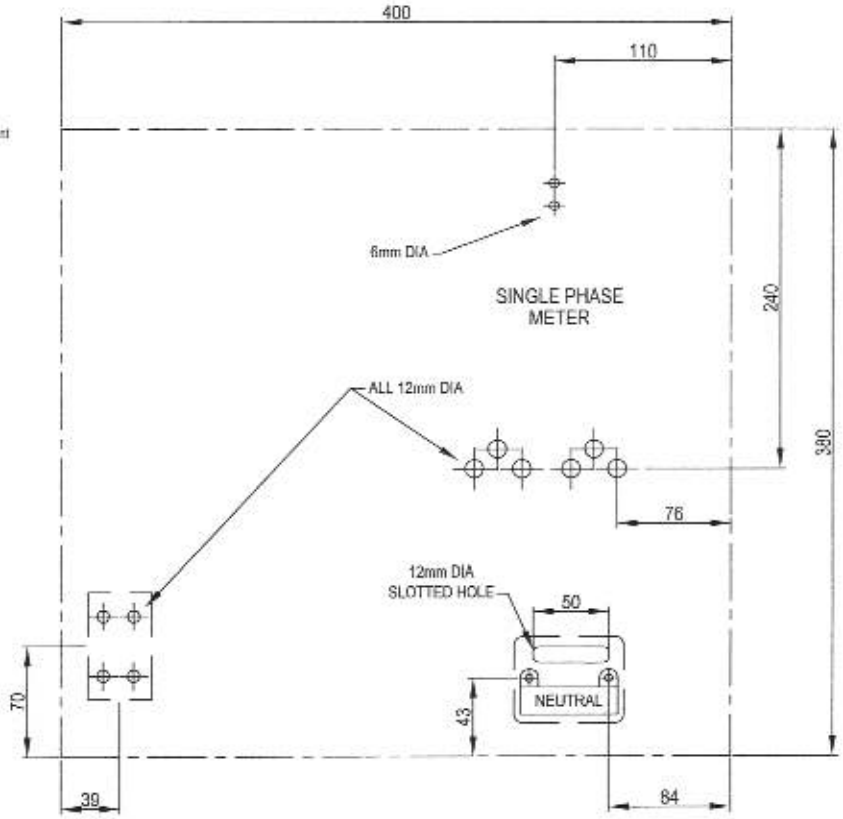
TYPICAL METERING DETAILS FOR ONE CUSTOMER
SINGLE PHASE WITHOUT OFF PEAK LOAD
PANEL SIZE 400mmW x 380mmH

Figure H1

ALINTA / UNITED ENERGY STANDARD INTERVAL METER (SUITABLE FOR TYPE 5)



WIRING DIAGRAM



NOTE - ALL HOLE 3mm DIA UNLESS OTHERWISE SHOWN

METER PANEL LAYOUT

Notes:

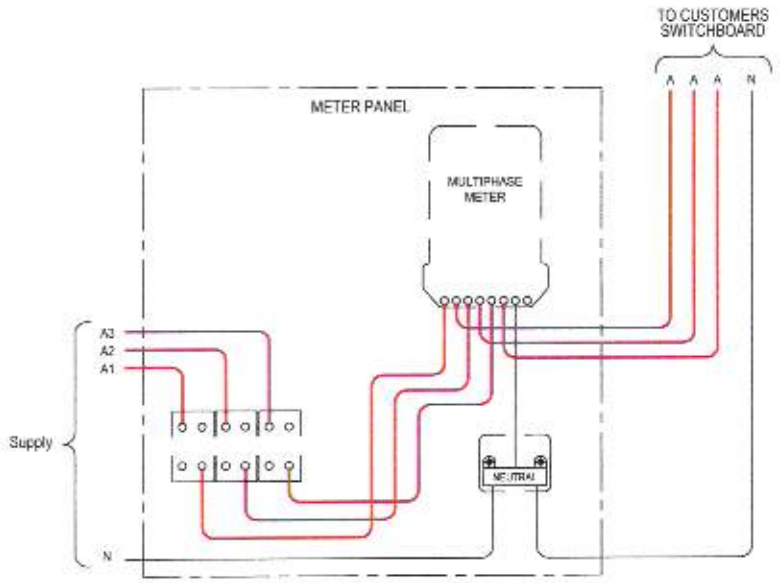
1. Meter panel fuse is not required for an overhead supply.
2. All metering neutrals to be 4mm2 minimum stranded conductors.
3. Refer to Fig. 6.32 for meter template.
4. Refer to Table 6.1 for conductor size limitations.
5. Off Peak Electric Hotwater control N/A for non-domestic and Co-Generation
6. 30 amp contactor only supplied.

TYPICAL METERING DETAILS FOR ONE CUSTOMER SINGLE PHASE WITH OFF PEAK ELECTRIC HOT WATER

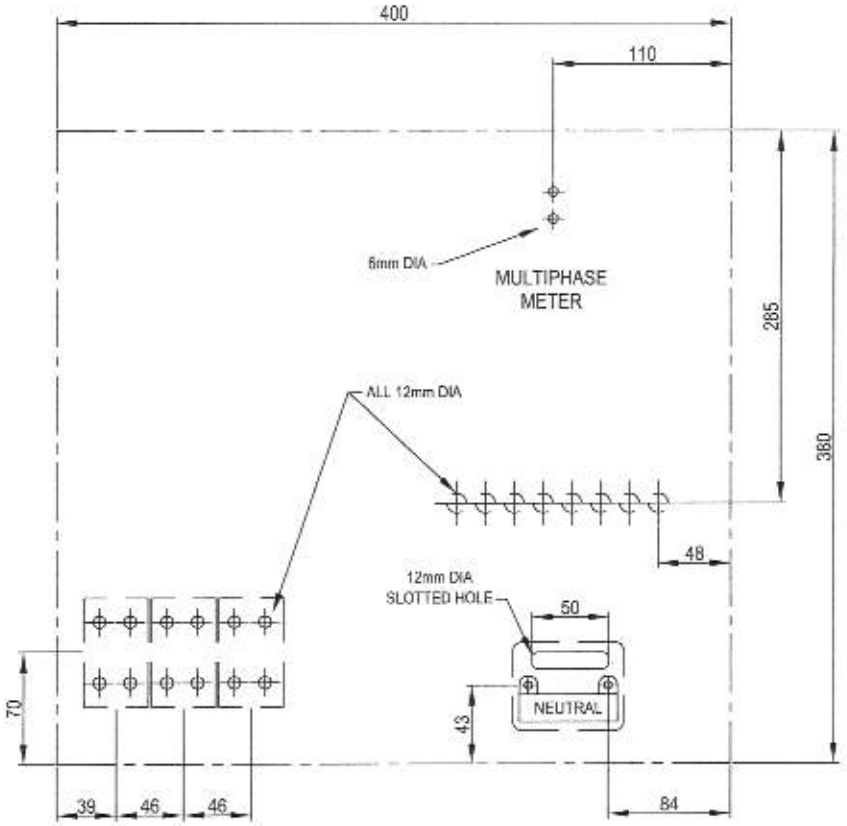
PANEL SIZE 400mmW x 380mmH

Figure H2

ALINTA / UNITED ENERGY STANDARD BASIC METER (SUITABLE FOR TYPE 6)



WIRING DIAGRAM



NOTE - ALL HOLE 3mm DIA UNLESS OTHERWISE SHOWN

METER PANEL LAYOUT

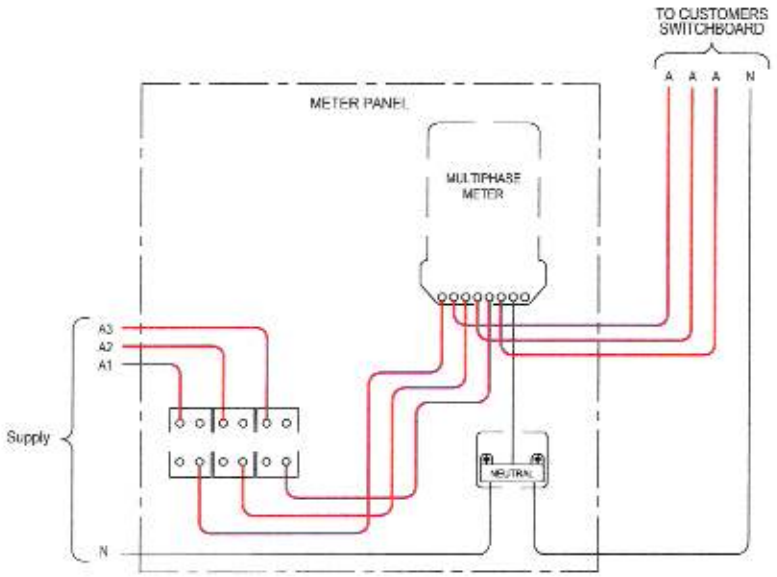
Notes:

1. Meter panel fuses are not required for an overhead supply.
2. All metering neutrals to be 4mm2 minimum stranded conductors.
3. Refer to Fig. 6.32 for meter template.
4. Refer to Table 6.1 for conductor size limitations.
5. Where a constant 3 Phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.

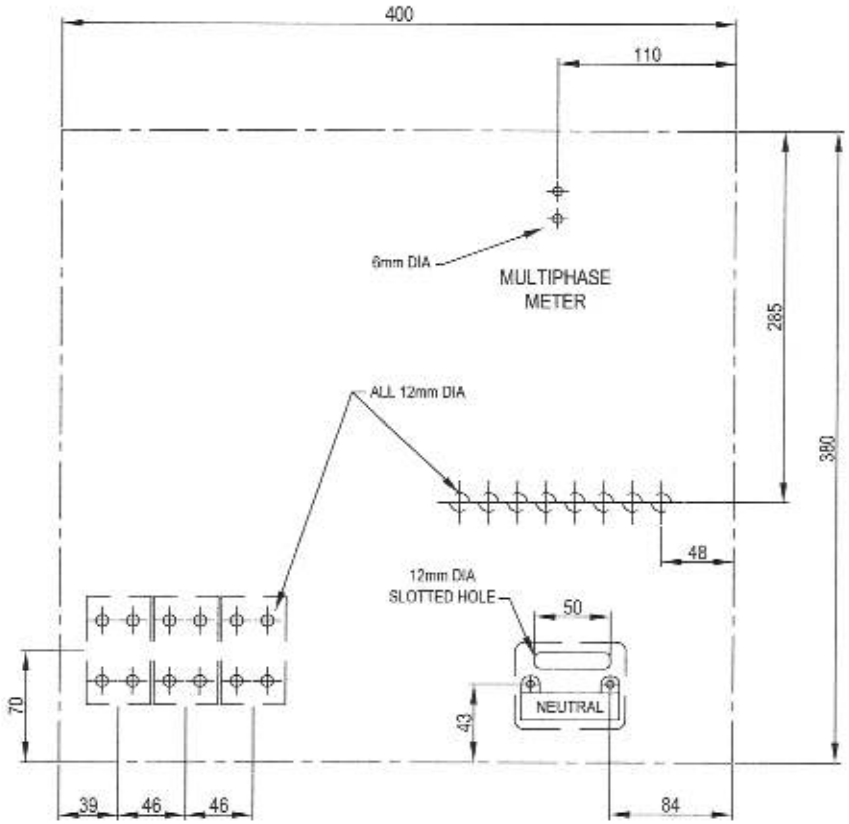
Figure H3

TYPICAL METERING DETAILS FOR ONE CUSTOMER
MULTIPHASE ONE RATE
PANEL SIZE 400mmW x 380mmH

ALINTA / UNITED ENERGY STANDARD INTERVAL METER (SUITABLE FOR TYPE 5)



WIRING DIAGRAM



NOTE - ALL HOLE 3mm DIA UNLESS OTHERWISE SHOWN

METER PANEL LAYOUT

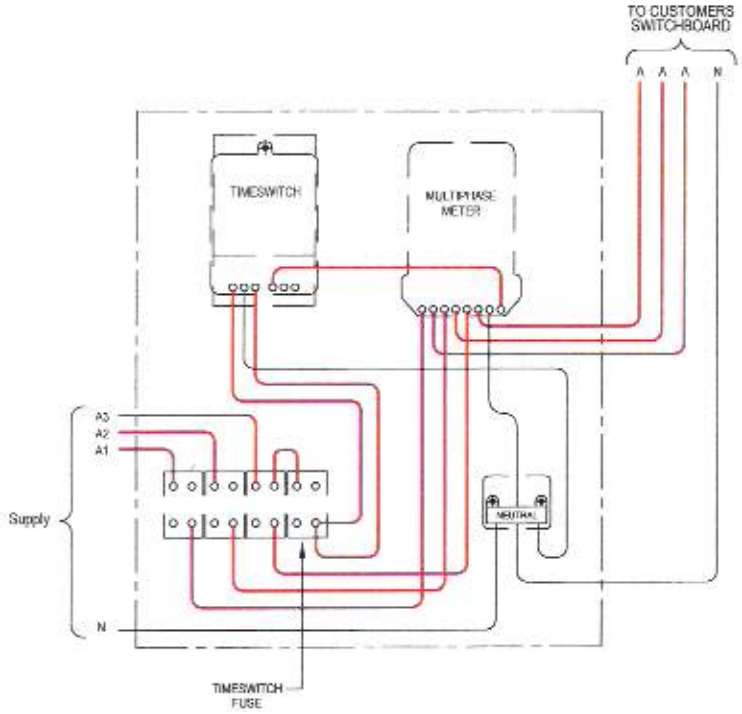
Notes:

1. Meter panel fuses are not required for an overhead supply.
2. All metering neutrals to be 4mm2 minimum stranded conductors.
3. Refer to Fig. 6.32 for meter template.
4. Refer to Table 6.1 for conductor size limitations.
5. Where a constant 3 Phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.
6. No load control available.

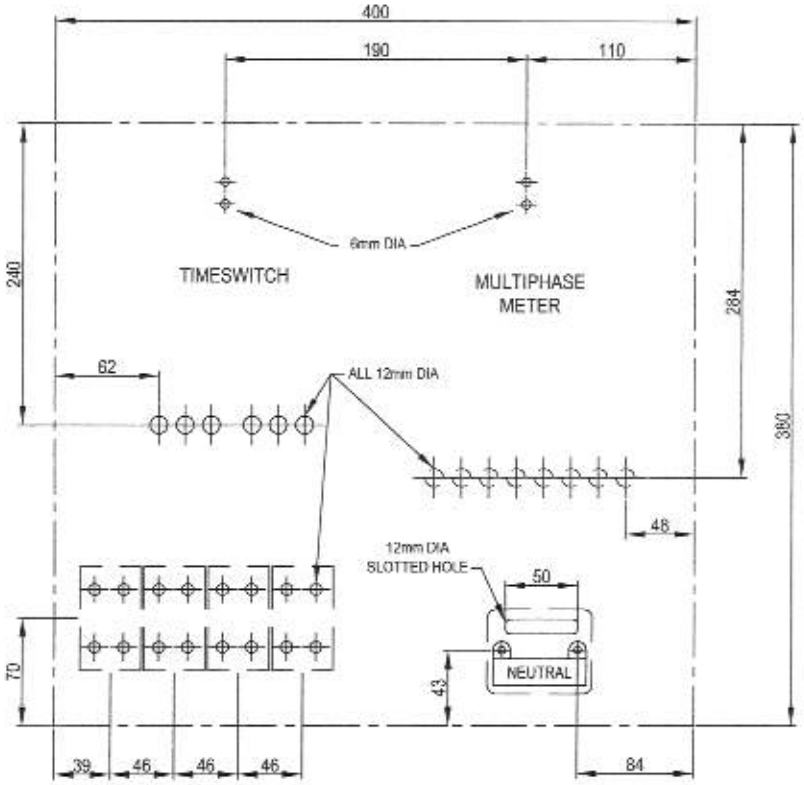
TYPICAL METERING DETAILS FOR ONE CUSTOMER
MULTIPHASE ELECTRONIC INTERVAL METER
PANEL SIZE 400mmW x 380mmH

Figure H4

ALINTA / UNITED ENERGY STANDARD BASIC METER (SUITABLE FOR TYPE 6)



WIRING DIAGRAM



NOTE - ALL HOLE 3mm DIA UNLESS OTHERWISE SHOWN

METER PANEL LAYOUT

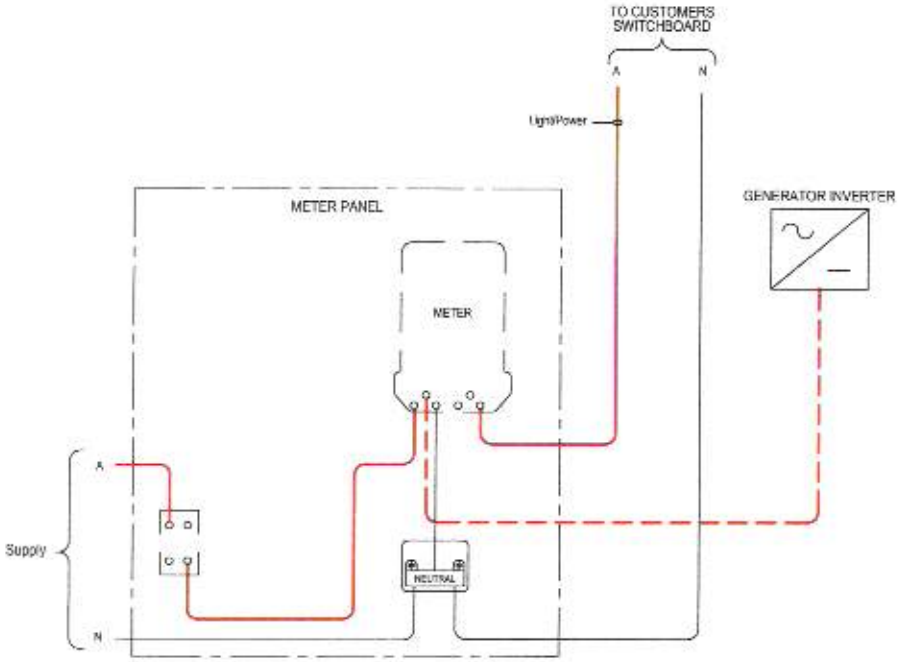
Notes:

1. Meter panel fuses not required for an overhead supply.
2. All timeswitch wiring and metering neutrals to be 4mm2 minimum stranded conductors.
3. Timeswitch fuse is required for all installations other than domestic.
4. Refer to Fig. 6.32 and 6.33 for meter and timeswitch templates.
5. Refer to Table 6.1 for conductor size limitations.
6. Where a constant 3 Phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.
7. No load control available.
8. One timeswitch per meter must be applied.

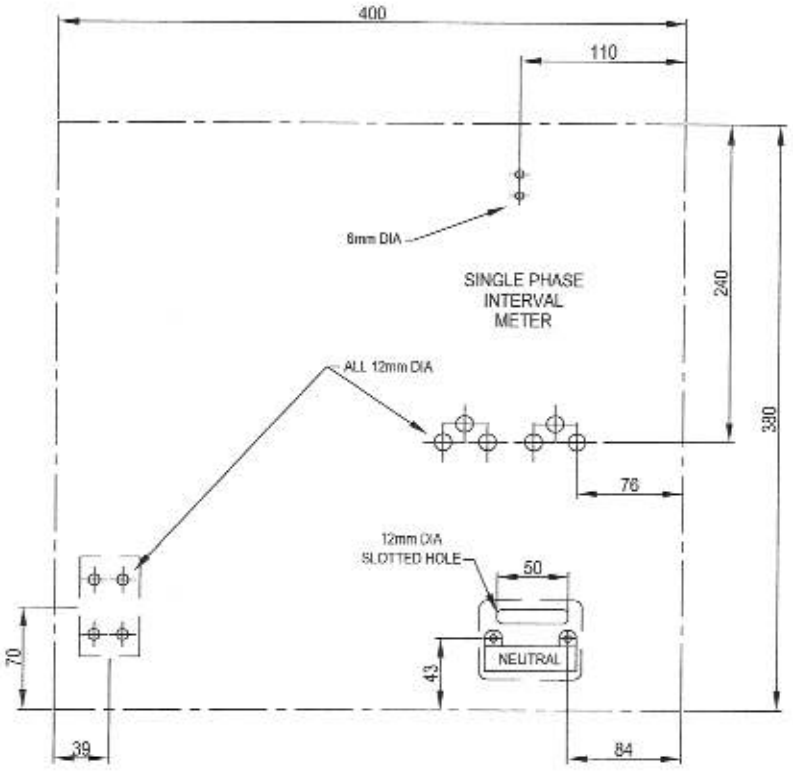
Figure H5

TYPICAL METERING DETAILS
FOR ONE CUSTOMER
MULTIPHASE 2 RATE
PANEL SIZE 400mmW x 380mmH

ALINTA / UNITED ENERGY STANDARD BASIC METER (SUITABLE FOR TYPE 6)



WIRING DIAGRAM



NOTE - ALL HOLE 3mm DIA UNLESS OTHERWISE SHOWN

METER PANEL LAYOUT

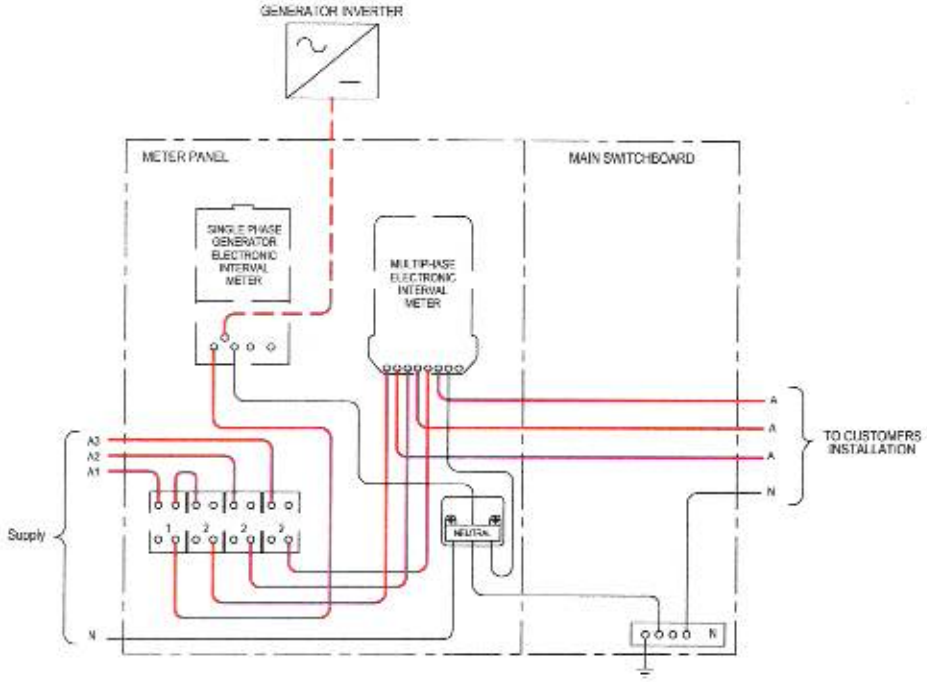
Notes:

1. Meter panel fuse is not required for an overhead supply.
2. All metering neutrals to be 4mm2 minimum stranded conductors.
3. Refer to Fig. 6.32 for meter template.
4. Refer to Table 6.1 for conductor size limitations.
5. Cable from Generator Inverter to b4 4mm2 stranded conductors.
6. Refer to AS4777 for isolation points and installation requirements for a pV system.
7. Must be suitably labeled.

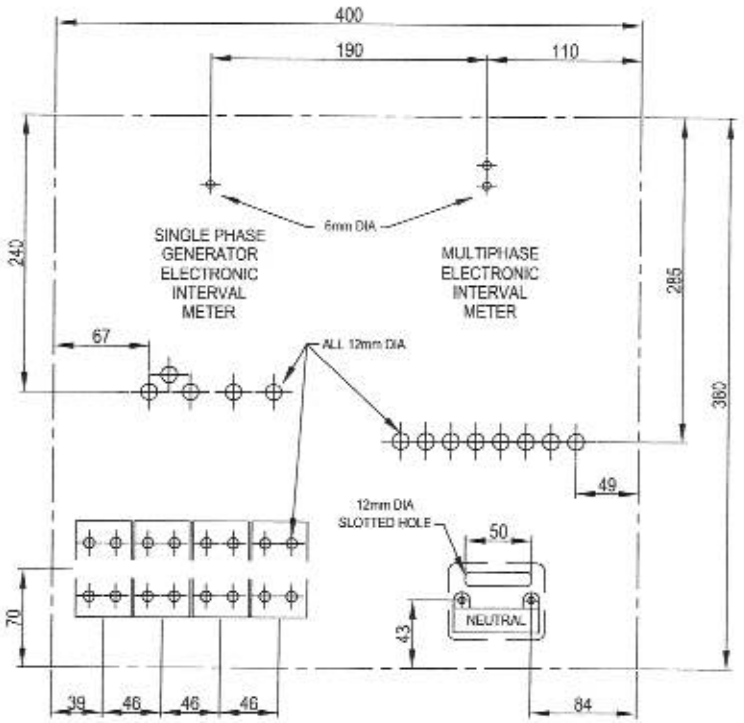
Figure H6

TYPICAL METERING DETAILS FOR ONE CUSTOMER
SINGLE PHASE WITH OR WITHOUT OFF PEAK LOAD
WITH SINGLE PHASE GRID CONNECTED GENERATION
PANEL SIZE 400mmW x 380mmH

ALINTA / UNITED ENERGY STANDARD BASIC METER (SUITABLE FOR TYPE 6)



WIRING DIAGRAM



NOTE - ALL HOLE 3mm DIA UNLESS OTHERWISE SHOWN

METER PANEL LAYOUT

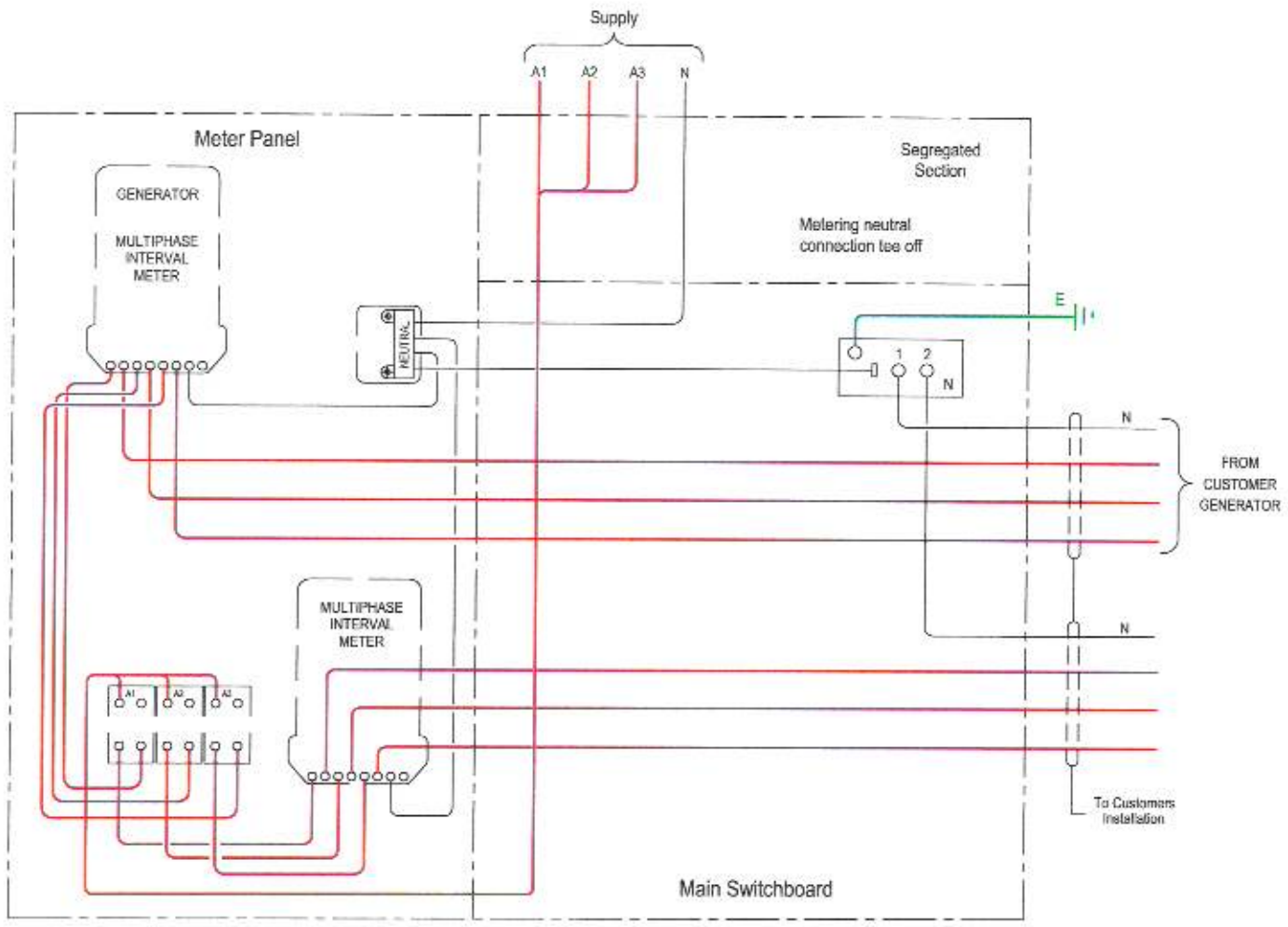
Notes:

1. Meter panel fuses are required for each customer in overhead or underground supply areas.
2. All metering neutrals to be 4mm2 minimum stranded conductors.
3. Refer to Fig. 6.31 and 6.32 for meter templates.
4. Refer to Table 6.1 for conductor size limitations.
5. Where a constant 3 Phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be necessary.
6. Cable from Generator Inverter to be 4mm2 stranded conductors.
7. No load control available.
8. Must be suitably labeled.

TYPICAL METERING DETAILS FOR ONE CUSTOMER
1 - MULTIPHASE ELECTRONIC INTERVAL METER FOR CUSTOMER LOAD AND
1- SINGLE PHASE ELECTRONIC INTERVAL METER FOR SINGLE PHASE GRID CONNECTED GENERATION WITHOUT OFF-PEAK LOAD
PANEL SIZE 400mmW x 380mmH

Figure H7

ALINTA / UNITED ENERGY STANDARD BASIC METER (SUITABLE FOR TYPE 6)



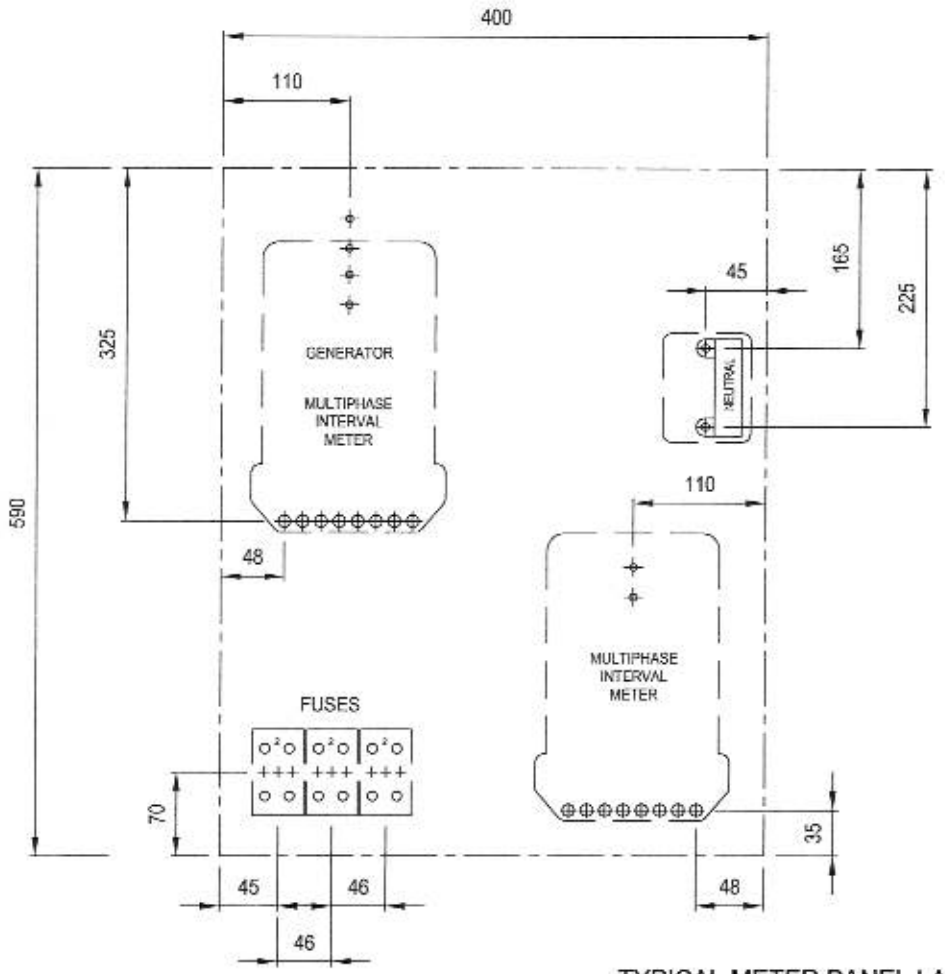
Notes:

1. Refer to Table 6.1 for conductor size limitations
2. No Load Control Available.
3. Must be suitably labeled.

Figure H8

TYPICAL WIRING DIAGRAM
1 CUSTOMER MULTIPHASE INTERVAL METER
METER FOR CUSTOMER LOAD AND MULTIPHASE ELECTRONIC INTERVAL METER FOR MULTIPHASE GRID CONNECTED GENERATION
PANEL SIZE 400mmW x 590mmH

ALINTA / UNITED ENERGY STANDARD BASIC METER (SUITABLE FOR TYPE 6)



Note:

Where constant 3 phase load in excess of 80A per phase is expected, the meter panel fuses should be spaced not less than 20mm apart. In some cases, to accommodate this spacing, a larger meter panel may be neccessary.

TYPICAL METER PANEL LAYOUT
1 CUSTOMER MULTIPHASE INTERVAL METER
METER FOR CUSTOMER LOAD AND MULTIPHASE ELECTRONIC
INTERVAL METER FOR MULTIPHASE GRID CONNECTED GENERATION

Figure H9