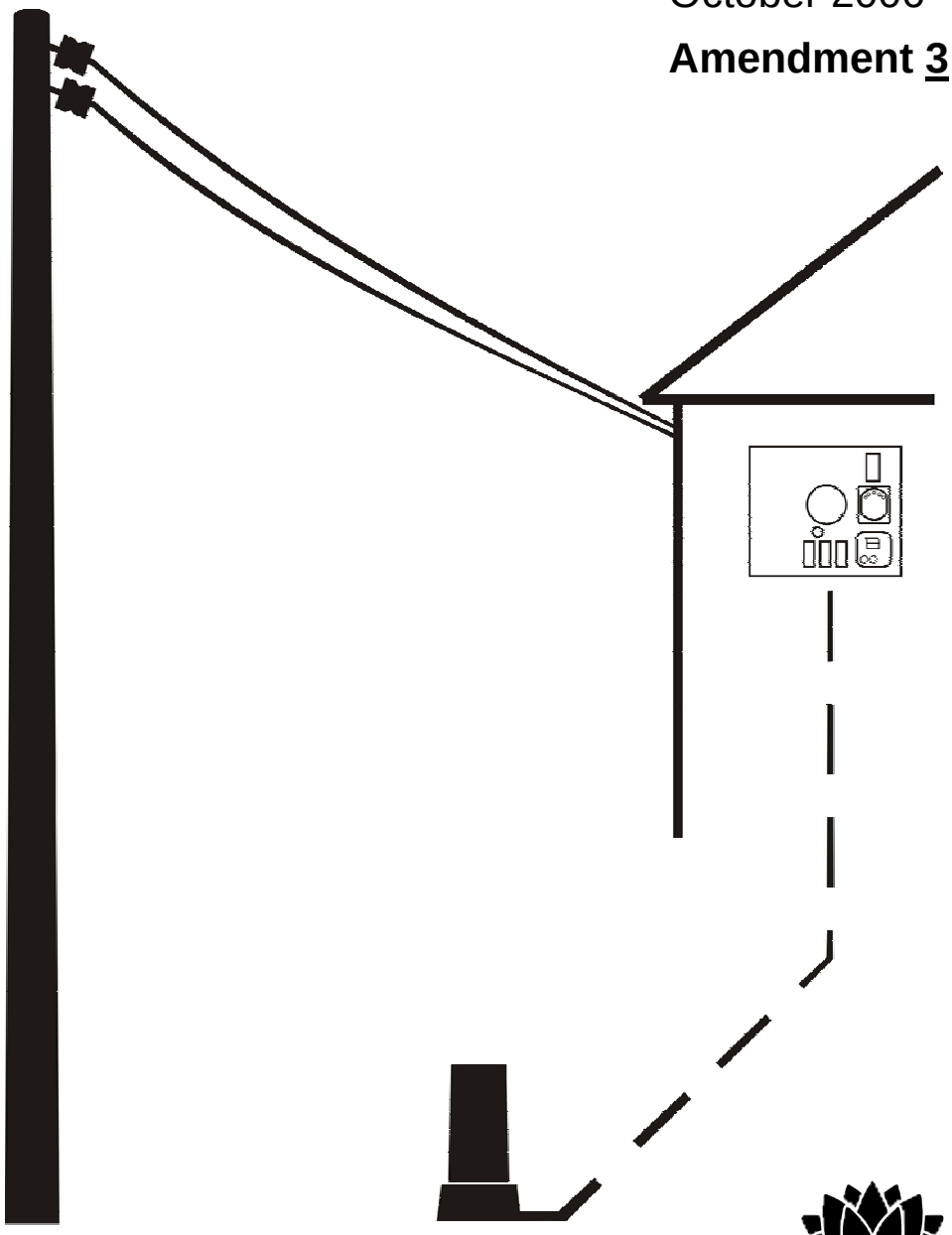
Service and Installation Rules of New South Wales

The electricity industry standard of best practice for customer connection services and installations

October 2006

Amendment 3: January 2010



NSW GOVERNMENT | Industry & Investment

Foreword

This is the January 2010 revision to the January 2009 edition of the Rules which incorporates amendments identified since the January 2009 edition was issued. The changes are essentially minor and non-controversial and also include typographical corrections. The changes were agreed to by the members of the Management Committee identified in the acknowledgements.

The Service and Installation Rules of New South Wales (Rules) 2006 were prepared by the Service and Installation Rules of New South Wales Committee (Committee). It supersedes the 1999 edition of the New South Wales Service and Installation Rules prepared by the Electricity Association of New South Wales.

The Rules (dated 1 October 2006 took effect from 1 January 2007) are the recognised industry code outlining requirements of electrical distributors when connecting a customer to the distribution systems of New South Wales.

The 2006 edition of the Rules has no reference to any local requirements, as the electrical distributors have agreed to abandon local Rules.

The Rules are incorporated by reference in the Code of Practice for Service and Installation Rules.

The Rules set out the minimum standards for providing safe, reliable and efficient connection services to customer premises.

Neither the Committee nor Industry & Investment NSW accept any responsibility for:

- the design, operation or failure of any electrical installation or installation work; or
- any loss or damage occasioned to any person or property as a result of carrying out connection services.

Compliance with these Rules does not necessarily ensure satisfactory operation of electrical installations or installation work. The contractor is responsible for carrying out any additional work to ensure satisfactory operation.

The Committee comprised representatives of government, electricity distributors, contractors and other stakeholders. It consulted widely through the industry and a range of stakeholders while developing the Rules.

The Committee is responsible for resolving issues, monitoring the impact and further development of the Code of Practice and the Rules. This edition includes the current amendments as agreed to by the Committee. Further editorial amendments will be considered at future meetings of the Committee.

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

Comments or enquiries on the provisions of these Rules should be directed to the electricity distributor.

Robert Smith
Convenor
SERVICE AND INSTALLATION RULES OF NEW SOUTH WALES
MANAGEMENT COMMITTEE

Acknowledgements

The following officers who were members of the Committee are acknowledged for their efforts in the preparation of this document.

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Garry Miller	National Electrical & Communications Association (Current Member)
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Manfred Kleppsch	Aggreko (Generator Industry Specific Advice)

Comments and Enquiries

Contact details for Electricity Distributors for comments and enquiries on the provision of these Rules.

ENERGYAUSTRALIA

Erina: (02) 4325 8537
Serving customers on the NSW Central Coast area.

Hornsby: (02) 9477 8201
Serving the customers from south of the Hawkesbury River to the north side of Sydney Harbour and the Parramatta River.

Muswellbrook: (02) 6542 9017
Serving customers in the Muswellbrook, Scone, Merriwa and Singleton areas.

Oatley: (02) 9585 5774
Serving customers south of Sydney Harbour and Parramatta River.

Wallsend: (02) 4951 9930
Serving customers in the Cessnock, Lake Macquarie, Newcastle, Maitland and Port Stephens areas.

INTEGRAL ENERGY 131 081
Serving all areas of Integral Energy

COUNTRY ENERGY 13 23 56
Serving all areas of Country Energy

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Summary of Contents

Amendment Status Schedule

Amendment Number	Date Issued	Sections Affected
1	**October 2007**	**All Sections**
2	**January 2009**	**All Sections**
3	**January 2010**	**All Sections**

Notes:

1. Industry & Investment NSW (I&I NSW) may, at intervals of not more frequently than six months from the date of publication, make amendments to these Rules, including this Amendment Status Schedule.
2. I&I NSW may publish amendments to these Rules on its website at no charge for downloading the amendments.
3. The purchaser or custodian of these Rules is responsible for ensuring that this Amendment Status Schedule and the relevant Sections are maintained in up to date condition. No liability is accepted for errors or events arising from a failure or omission to update these Rules.

Section 1

General Requirements

Service and Installation Rules of New South Wales
October 2006
Amendment 3: January 2009

CONTENTS

1 General Requirements

1.1 NSW ELECTRICITY DISTRIBUTOR AREAS

1.1.1 EnergyAustralia

24 Hour emergency	13 13 88
General enquiries	13 15 25
Streetlighting	1800 044 808

EnergyAustralia®

1.1.2 Integral Energy

General enquiries	13 10 81
Emergencies	13 10 03

INTEGRAL energy

The power is in your hands

1.1.3 Country Energy

General enquiries	13 23 56
Electricity supply interruptions	13 20 80

countryenergy

1.2 DEFINITIONS

Meanings for the words used in this document are listed below. Figures 1.1 and 1.2 assist in the usage of these definitions.

1.2.1 Accredited Meter Provider

Means a person who meets the requirements listed in Schedule 7.4 of the National Electricity Rules and is registered with the Australian Energy Market Operator (AEMO), or their agency.

1.2.2 Accredited Service Provider

Means an individual or entity accredited in accordance with the Electricity Supply (General) Regulation 2001.

Note: An accredited service provider can be an individual, partnership, or company.

1.2.3 Authorisation

Permission granted to an individual in writing by an electrical distributor, for work on or near an electrical distributor's distribution system.

1.2.4 Connection Point

Means the point at which the service connects to the distribution system. Refer to Figures 1.1 and 1.2.

Note: Connection Point was formerly known as point of supply.

1.2.5 Consumers Mains

Consumers' mains are the conductors between the point of supply and the main switchboard and form part of an electrical installation. Consumers' mains may be overhead, underground or within a structure. Refer Figures 1.1 and 1.2.

1.2.6 Contractor

Means a licensed electrical contractor who carries out installation work or tests on an electrical installation.

1.2.7 Customer

A customer is an individual or entity who (either personally or through an agent) applies for or receives or makes use of a connection of an electrical installation to the electricity distributor's distribution system.

1.2.8 Customer Connection Contract

Is a contract between the network operator and a customer that contains the terms and conditions under which a customer's installation is connected to the electricity distributor's distribution system. These contracts come in two generic forms, namely 'standard form' or deemed contracts or 'negotiated' by individual mutual agreement.

It is a regulatory requirement that the standard form customer connection contract be available upon the request of the customer.

1.2.9 Distribution Area

Distribution area in relation to the electricity distributor means the area in which the electricity distributor is licensed to operate its distribution system under the Electricity Supply Act 1995.

1.2.10 Industry & Investment NSW

Industry & Investment NSW, (I&I NSW) formed in July 2009. I&I NSW's vision is: *'Secure, efficient and affordable energy supplies'.*

1.2.11 Distribution System

Means the electricity power lines, associated equipment and electricity structures that are used to convey and control the conveyance of electricity to the premises of wholesale and retail customers, or to convey and control the conveyance of electricity to, from and along the rail network electricity system, operated by RailCorp. A distribution system does not include a transmission system. Refer to clause 1.2.22.

1.2.12 Electrical Installation

Means as defined by the *Electricity (Consumer Safety) Act 2004:* any fixed appliances, wires, fittings, apparatus or other electrical equipment used for (or for purposes incidental to) the conveyance, control and use of electricity in a particular place, but does not include any of the following:

(a) Subject to any regulation made under subsection (4) - any electrical equipment used, or intended for use, in the generation, transmission or distribution of electricity that is:

  (i) Owned or used by an electricity supply authority, or

  (ii) Located in a place that is owned or occupied by such an authority.

(b) Any electrical article connected to, and extending or situated beyond, any electrical outlet socket.

(c) Any electrical equipment in or about a mine.

(d) Any electrical equipment operating at not more than 50 volts alternating current or 120 volts ripple-free direct current.

(e) Any other electrical equipment, or class of electrical equipment, prescribed by the regulations.

1.2.13 Electricity Distributor

Electricity distributor, in relation to any electrical installation or installation work, means the electricity distributor within whose distribution area the installation is situated or where the work is carried out.

Note: RailCorp is the electricity distributor for electrical installations on Railway land.

1.2.14 High Voltage Installation Responsible Person

The owner, controller or operator of a high voltage installation.

1.2.15 Overhead Service

Means overhead or aerial conductors, operating at a voltage not exceeding 600/1000 volts, between the electricity distributor's distribution system and the point of supply. An overhead service is referred to as an overhead service in these Rules. Refer to Figure 1.1.

The service comes under the ownership, control and maintenance of the electricity distributor as part of its network. The service does not include the bracket, mains connection box or other form of anchor at which the service is terminated, but includes the strain clamp at the POA and the connection device at the point of supply.

1.2.16 Point of Attachment (POA)

Means the point or points, at which aerial conductors of an overhead service or aerial consumer's mains are terminated on a customer's building, pole or structure. Refer to Figure 1.1 and 1.2.

1.2.17 Point of Supply

Means the junction of an electricity distributor's conductors with consumer's mains. Refer to Figures 1.1 and 1.2.

Note: Point of Supply was formerly known as Consumers Terminals.

1.2.18 RailCorp

RailCorp is the electricity distributor for electrical installations on railway land within the railway 1500V dc electrified track area.

The 1500V dc electrified track area is currently bounded by Newcastle, Bowenfels, Glenlee and Dapto, and is where overhead wiring for the 1500V dc electric traction system has been erected above the railway track.

RailCorp also supplies a limited number of customers between Newcastle and Muswellbrook, Port Waratah, Kooragang, and Werris Creek from its high voltage distribution system.

1.2.19 Service and Metering Equipment

Means the electricity distributor's and/or the accredited meter provider's equipment associated with the supply, control and metering of electricity to a customer. It includes associated equipment that may or may not be provided by the electricity distributor to meter and control (e.g. meters, current and voltage transformers, communication equipment and wiring), to protect (eg service fuses), support (eg brackets), connect (eg neutral links, service connection boxes) and secure (eg seals) the service, meters and control devices.

1.2.20 Service Fuse

A 100 Amp fuse which complies with Clause 4.7.2, located on the un-metered side of the installation intended for the isolation and protection of whole-current metering and customer installation isolation.

For services up to 100 Amp, the service fuse performs the service protective device role.

1.2.21 Service Protective Device

The first protection device which complies with Clause 4.7, located after the point of supply.

1.2.22 Transmission System

Means any electricity powerlines and associated equipment and electricity structures that are a transmission system by virtue of an order in force under section 93 of the Electricity Supply Act 1995.

A transmission line is part of a transmission system and is normally a powerline or underground power cable with a voltage greater or equal to 132kV. Where the voltage is greater than 22kV and less than 132kV it is called a subtransmission line.

1.2.23 Underground Service

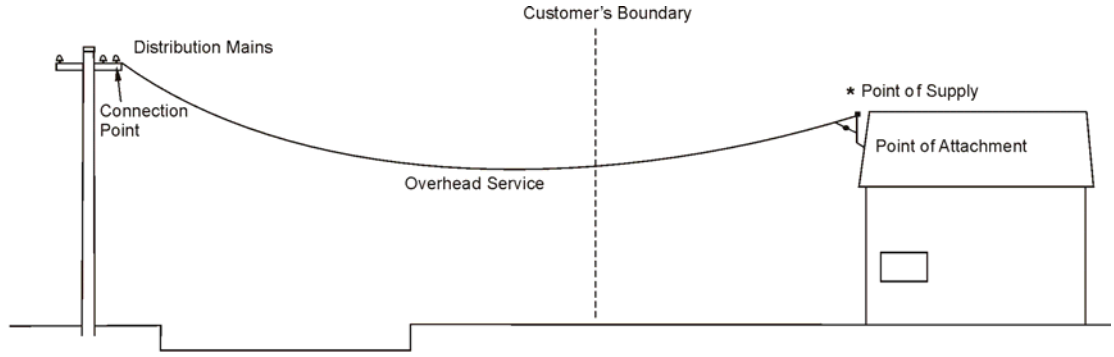
Means underground cables, operating at a voltage not exceeding 600/1000 volts, between the electricity distributor's distribution mains and a customer's point of supply.

The service comes under the ownership, control and maintenance of the electricity distributor as part of its network. The service does not include the conduit, structure or enclosure protecting or enclosing the cable that is situated on land to which the customer has a legal right of access for the purpose of owning or maintaining the installation.

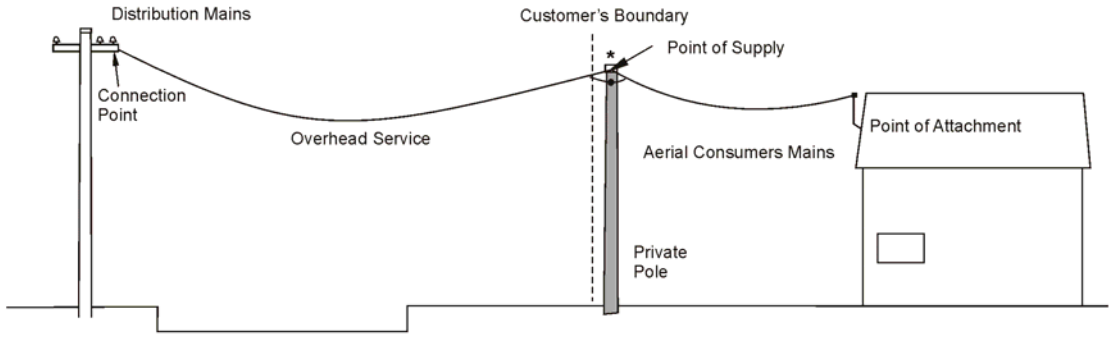
1.2.24 Underground Supply from an Overhead System (UGOH)

Underground supply from an overhead distribution system (UGOH) is a term used where a customer is supplied by an underground service from an overhead distribution system.

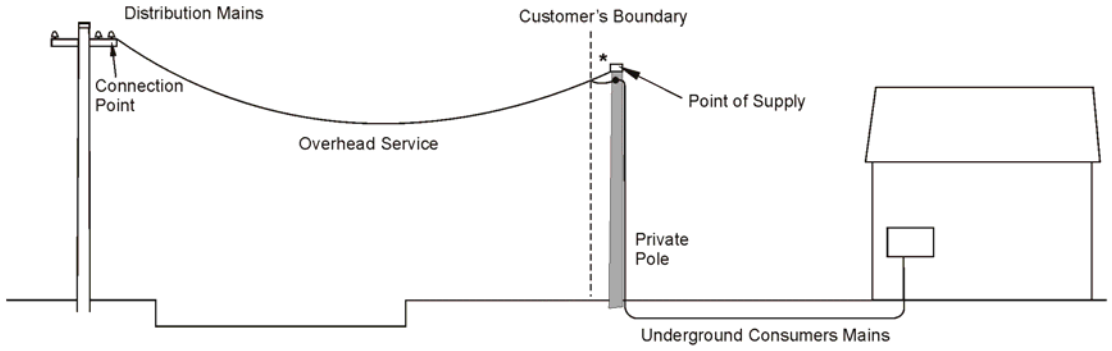
Figure 1.1: Definitions – Supply from Overhead Distribution Mains



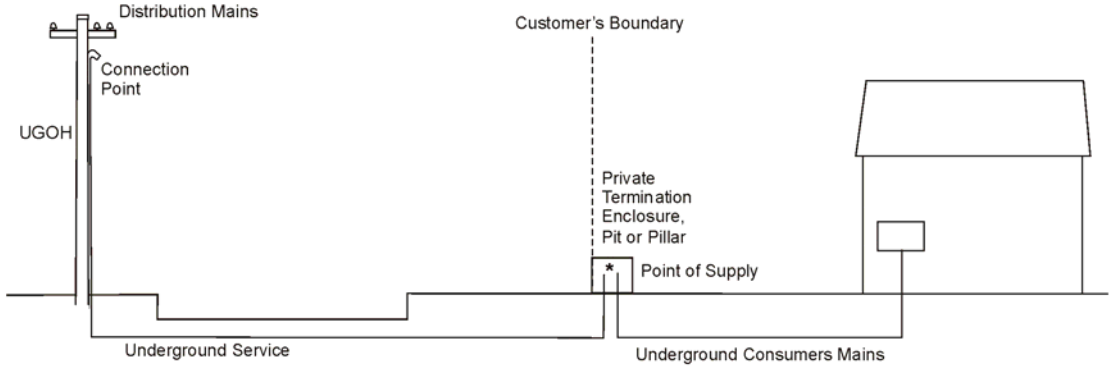
(a) Overhead Service



(b) Overhead Service and Aerial Consumers Mains



(c) Overhead Service and Underground Consumers Mains

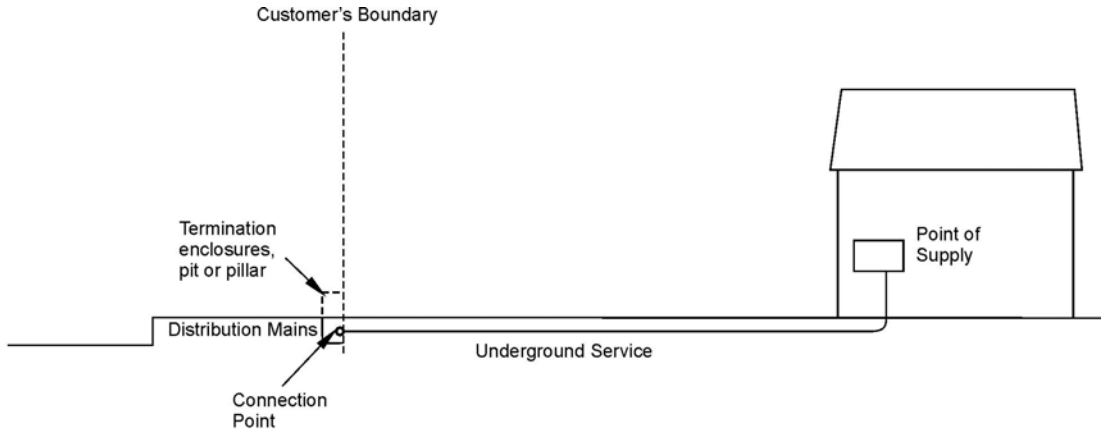


(d) Underground Service and Consumers Mains from Overhead Mains on Electricity Distributor's Pole

* A connection must be able to be made at the Point of Supply

NOTE: Terminal enclosure, pit or pillar is required if service exceeds 50 metres. Refer to clause 2.7.3 in Section 2.

Figure 1.2: Definitions – Supply from Underground Distribution Mains



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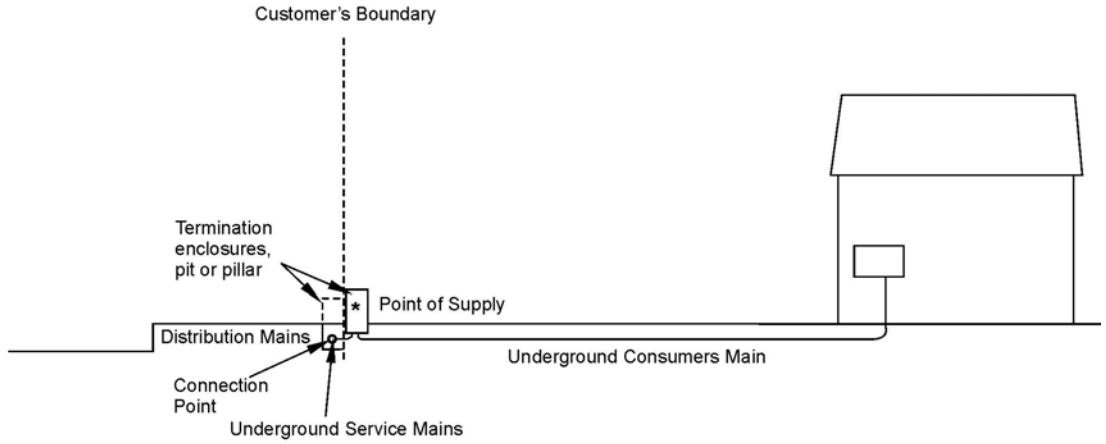
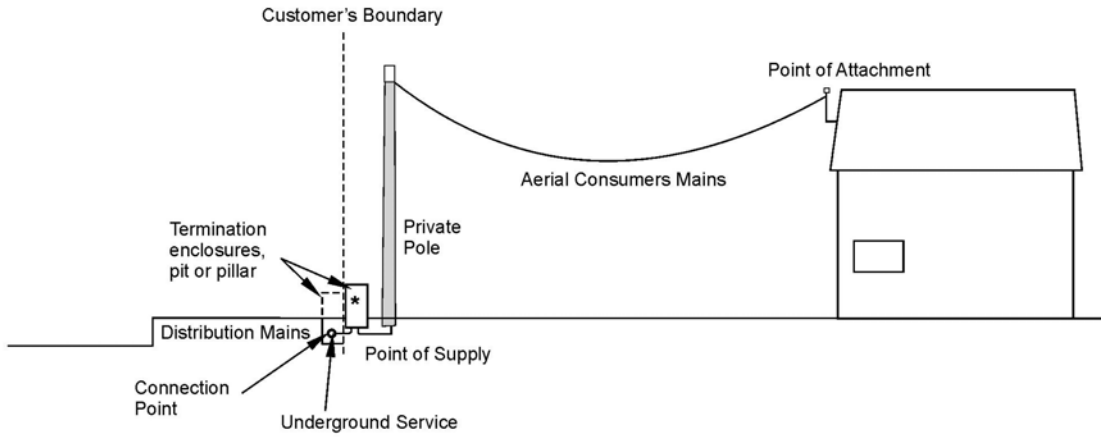


(b) Underground Service and Underground Consumers Mains



(c) Underground Service and Aerial Consumers Mains

* A connection must be able to be made at the Point of Supply

1.3 GENERAL

1.3.1 Introduction

The objective of the Service and Installation Rules of New South Wales is to achieve the minimum standards for providing safe, reliable and efficient connection services to customer premises.

The Rules:

(a) Give guidance and minimum requirements for the provision of customer connection services.

(b) Should be followed unless there is an agreed alternative course of action, which achieves the same or better result.

(c) Can be used in support of enforcement provisions of the Electricity Supply Act 1995.

(d) Can be used to support prosecution for failing to comply with or contravening provisions of the Electricity Supply Act 1995 or associated regulations.

(e) Are consistent with the NSW electricity distribution industry's requirements for preserving market integrity, security, reliability and safety of the system while minimising interference between and to its customers.

These Rules establish conditions for connection of electrical installations to the electricity distributor's distribution system and are consistent with the following documents, as amended:

(f) Electricity (Consumer Safety) Act 2004 covering among other things:

  i) Electrical articles.

  ii) Electrical apparatus and appliances.

  iii) Accident reporting and investigation.

(g) Electricity Supply Act 1995 which requires the electricity distributor among other things to:

  i) Connect customers under the provisions of a customer connection contract.

  ii) Develop and implement a plan setting out policies, practices and procedures with respect to the conduct of affairs under its licence.

(h) Electricity (Consumer Safety) Regulation 2006 covering among other things:

  i) Safety of electrical installations.

  ii) Notification of installation work.

  iii) Testing of installation work.

  iv) Maintenance of existing electrical installations.

(i) Electricity Supply (General) Regulation 2001 covering among other things:

  i) Customer rights.

  ii) Standard form customer contracts.

  iii) Appeals.

  iv) Accreditation.

  v) Customer protection.

(j) Electricity Supply (Safety and Network Management) Regulation 2008 which requires electricity distributors among other things to develop and implement:

  i) Safety and Network Management Plans.

  ii) Customer Installation Safety Plans.

  which take into account the Code of Practice Service and Installation Rules.

(k) Australian/New Zealand Standard 3000 'Electrical installations' (Wiring Rules).

The electricity distributors recognise these Rules as the industry standard.

The customer connection contract specifies these Service and Installation Rules, which describe the electricity distributor's requirements for connecting electricity supply.

These Rules must be read together with the terms and conditions of the electricity distributor's customer connection and customer supply contract.

1.3.2 Regulatory Provisions

The Electricity Supply (Safety and Network Management) Regulation 2008 requires each electricity distributor notified by the I&I NSW's Director General, to prepare and implement a Network Management Plan with chapters on:

(a) Network Safety and Reliability.

(b) Customer Installation Safety.

(c) Public Electrical Safety Awareness.

(d) Bush Fire Risk Management.

The Regulation also provides that the Network Management Plan and Customer Installation Safety Plan must take into account codes, standards and guidelines as the Director General notifies to the network operator. The plans must specify where they, or their implementation, depart from the provisions of any such code, standards or guideline and what arrangements are in place to ensure an equal or better outcome.

1.3.2.1 Notice Requirements

The notice required the distributors to take the following Codes into account in relation to the Network Management Plan:

(a) ENA NENS 01 - 2001 National Electricity Network Safety Code, except that:

i) Clause 5.3.1 of the Code must not be applied to clearances of overhead services and other cable systems, as defined in HB C(b)1. For these clearances, in lieu of HB C(b)1, clause 5.3.5.2 of the Electricity Association of NSW Code of Practice for Electricity Transmission and Distribution Asset Management, November 1997, is required to ensure maintenance of existing higher clearances in NSW.

ii) In relation to clause 7.3.3 of the Code, the new ENA NENS 04 – 2003 National Guidelines for Safe Approach Distances to Electrical Apparatus, is to be regarded as an ENA Guideline for the purpose of this clause.

(b) I&I NSW Code of Practice - Contestable Works, March 1998.

(c) I&I NSW Code of Practice - Service and Installation Rules, September 2005.

(d) I&I NSW Code of Practice - Service Standards, February 1998.

(e) I&I NSW Code of Practice - Demand Management for Electricity Distributors, May 2004.

The notice also required the distributors to take the following Codes into account in relation to the Customer Installation Safety Plan:

(a) I&I NSW Code of Practice - Service and Installation Rules, September 2005.

(b) I&I NSW Code of Practice - Installation Safety Management, December 1997.

The Code of Practice - Service and Installation Rules incorporates these Rules by reference.

1.3.3 Fair Trading

Fair Trading administers the licensing and certification of electricians and undertakes disciplinary action under the Home Building Act 1989. Electrical contractors are responsible to their customers for matters under the Act, including statutory warranties for work that they, their employees and subcontractors do.

Fair Trading may also investigate complaints and disputes about electrical wiring work on consumers' installations. The Electricity (Consumer Safety) Regulation 2006 requires that electrical wiring work on an installation comply with AS/NZS 3000 (refer to subsection 1.9.4).

Electricity distributors assist in this regard by maintaining an effective liaison with Fair Trading through their system of audit inspection programs and reports on the investigation of shocks on consumers' installations under electricity distributors' Customer Installation Safety Plans.

Fair Trading also investigates complaints about electrical contractors under the Fair Trading Act 1987, and administers the Electricity (Consumer Safety) Regulation 2006. This includes the issue of certificates of approval for 'declared' electrical articles under a compulsory scheme and certificates of suitability for 'non-declared' articles. This Regulation ensures that the equipment complies with relevant Australian standards and any other minimum safety requirements.

1.3.4 Licensed Electrical Worker Requirements

The Home Building Act 1989 requires that all electrical wiring work must be done by an individual holder of an endorsed contractor's licence, or a qualified supervisor certificate for the category of electrical wiring work. A holder of a tradesperson certificate for the category of electrical wiring work may also carry out such work, but only under the supervision of an individual holder of an endorsed contractor licence or a qualified supervisor certificate for that category.

Electrical wiring work may only be done by a person who **does not hold** an endorsed licence or certificate if an individual holder of an endorsed contractor licence or a qualified supervisor certificate for the category of electrical wiring work is present during all work and is responsible for ensuring that the work is done correctly. Specific exemptions exist for work done by employees of electricity distributors.

WARNING

It is illegal for persons other than holders of a Qualified Supervisor Certificate, an individual endorsed Contractor Licence or other persons authorised by legislation, to work on the fixed wiring of any electrical installation.

Penalties for conviction are severe.

1.3.5 Obligatory Requirements

Legislation permits the electricity distributor to state its requirements for electrical installations.

The electricity distributor may:

(a) Impose conditions on the installation and use of electrical appliances and equipment to prevent or minimise adverse effects on the supply to other customers.

(b) Impose conditions on the loading, and the balancing of the load, over the phases of the customer’s supply.

(c) Require a minimum rupture rating or minimum breaking capacity of the customer’s main protective devices.

(d) Require the customer to install relays, current transformers and other protective

equipment having characteristics to suit the electricity distributor's protective system.

(e) Require the customer to provide free of cost, for use of the electricity distributor, suitable accommodation for transformers, switchgear and other equipment.

The electricity distributor may also:

(f) Make additional requirements where allowed by AS/NZS 3000.

(g) Make an interpretation of AS/NZS 3000.

(h) Affix seals to an electrical installation.

1.3.6 Damage

A customer may be held liable for the total cost of any damage caused by the customer to the electricity distributor's equipment installed on the premises. The customer may wish to cover this risk with insurance.

1.3.7 Damage to other Utilities

Accredited service providers are liable for the total cost of any damage caused to other utilities during service work. They must notify the relevant utility and the customer, and arrange for the repair of damage.

1.3.8 Clearance to other Utilities

The specified clearance should be maintained between the installed overhead service/ underground service and services of other utilities.

1.3.9 Purpose of these Rules

Electricity distributors are obliged to connect customers to their distribution system under a customer connection contract. The contract stipulates terms and conditions that must be satisfied by the electricity distributor and the customer. To ensure that the electrical installation can be connected to the distribution system, the electricity distributor can describe the requirements of the connection to its system (Service Rules) and compatible requirements of the electrical installation (Installation Rules).

These Rules provide uniform requirements for electricity distributors, accredited service providers, contractors and customers throughout NSW. This has been achieved by:

(a) Providing consistent requirements from electricity distributors.

(b) Specifying electrical installation requirements as permitted by AS/NZS 3000.

(c) Specifying service requirements to promote industry standardisation of equipment.

(d) Specifying service requirements which comply with the provisions of the Electricity Supply Act 1995.

(e) Including recommendations and advisory information which may indicate future requirements of AS/NZS 3000 and legislation.

(f) Providing information to the electricity supply industry, accredited service providers and the electrical contracting industry which enables them to work together to promote standardisation of systems and equipment.

1.3.10 Application

Electricity distributors have adopted these Rules through their customer connection contracts.

Where the word "must" appears, it indicates that the electricity distributor cannot negotiate with the customer on that particular matter.

Where other less definite terminology is used, a degree of flexibility is indicated and it may be feasible for the customer to negotiate with the electricity distributor. Where possible, the customer's wishes will be taken into account.

These Rules are designed to achieve safe, reliable and efficient outcomes for both the electricity distributor and customer.

Consideration of safety to customers, electricity workers and the general public are paramount - as well as considerations of potential liability.

Should a contravention of these Rules (or accepted alternative method) occur, the electricity distributor is entitled to refuse, suspend or discontinue supply, or require correction of the contravention subject to any resolution achieved by a dispute resolution process.

The Rules are presented in two parts:

i) Section 1 provides the fundamental legislative obligations, definitions, policy, conditions and informative statements.

ii) Sections 2 to 8 contain detailed design, material and construction information for services, service equipment and metering equipment. These serve to clarify the electricity distributor requirements and any alternatives, to accredited service providers, contractors and installation designers.

1.3.11 Alternative Methods

Where the customer proposes an alternative method that is not specifically contained in these Rules, the proposal must deliver the same or better level of safety, reliability and efficiency.

The electricity distributor must deal with proposals for alternative methods using the following procedure:

(a) Applications for alternative methods must be made in writing to the relevant electricity distributor.

(b) The electricity distributor must acknowledge receipt of the application in writing, within two weeks.

(c) The proposal must be given due consideration and a formal response provided in writing, within 10 business days (or as otherwise advised). The electricity distributor must outline the reasons for its decision.

(d) Appeals (where necessary) should be made to the electricity distributor in writing. The electricity distributor must review its decision and provide a written response, within one month (or as otherwise advised).

(e) Further appeals (where necessary), should be made in writing to Fair Trading, for assistance.

Acceptance of any proposed alternative method does not imply automatic recognition as an industry standard.

Where the customer does not comply with these Rules or an accepted alternative method the electricity distributor may:

i) Refuse, suspend or discontinue supply, or

ii) Require the customer to rectify the service work or comply with the conditions of connection of supply.

The electricity distributor will require the customer to pay for a re-inspection of the work in accordance with Independent Pricing and Regulatory Tribunal of New South Wales (IPART) determinations.

1.3.12 Dispute Resolution

If the electricity distributor and a customer are unable to resolve a dispute on matters related to these Rules using the electricity distributor's dispute resolution procedure, provided for in the customer connection contract, the customer may seek to have the matter resolved by the Energy and Water Ombudsman NSW (EWON) or by another process in accordance with the terms of the contract.

1.3.13 Safety and Environmental Risk Management

These Rules specify the technical requirements for service and metering work associated with electrical installations. Electrical contractors and accredited service providers trained and qualified to carry out this work must do so in accordance with the conditions of their electrical contractor's license, accreditation and authorisation as applicable. They must abide by all applicable safety and environmental legislative requirements. This includes a requirement to assess the safety and environmental risks associated with the carrying out of work and taking appropriate action to mitigate those risks. The general process is summarised as follows:

(a) Identify hazards associated with the work and the worksite.

(b) Assess the risks associated with the identified hazards.

(c) Implement appropriate control measures to mitigate the hazards.

An example of this process is the use of a Hazard Assessment Checklist (HAC) at the work site prior to commencing work. The HAC includes a check of tools and equipment and worksite safety and environmental hazards.

Refer to AS/NZS 4836 'Safe Working on Low Voltage Installations' as a guide.

1.4 ELECTRICITY SUPPLY

The electricity supplied to a customer's premises is subject to interruptions in availability and is subject to fluctuations and other disturbances that affect supply quality.

Customers may consider the need to ensure that equipment has sufficient immunity to extreme voltage fluctuations and purchase special protective equipment for situations caused by:

(a) Storms and lightning.

(b) Partial loss of supply, i.e. loss of one or two phases of a three phase supply to an installation.

1.4.1 Supply at 230/400 Volts (low voltage)

The electricity supply is alternating current of approximately sinusoidal wave form. It alternates at a frequency of 50Hz with a nominal voltage of 230/400 volts from a three phase four wire distribution system. In outlying areas, the supply may be from a single phase 230/460 volt three wire distribution system.

The normal 50Hz wave form is sinusoidal but may be modulated by signal frequencies for electricity distribution control and communication purposes. AS 60038-2000 'Standard voltages', provides details.

1.4.2 Supply at 230/460 Volts (low voltage)

In areas limited to 230/460 volt supply, contact the electricity distributor for advice on special supply arrangements. These systems are 2 or 3 wire distribution systems with 180-degree phase displacement.

1.4.3 Supply at High Voltage

Electricity supply may be provided at higher voltages if required. Contact the electricity distributor for advice on high voltage supply arrangements. Refer also to Section 7.

1.4.4 Supply from RailCorp

For electrical installations on railway land or supplied from the railway high voltage distribution system contact RailCorp (refer to clause 1.2.18).

1.5 PROVISION FOR SERVICES, SERVICE AND METERING EQUIPMENT

1.5.1 Service Specification

The electricity distributor may determine:

(a) The type, location and installation of service and metering equipment, including electricity meters and control devices.

(b) The type and rating of service fuses/service circuit breakers.

(c) The type, size and minimum rating of service conductors.

(d) The construction and route of services.

(e) The accommodation of any transformers, switchgear and other electricity distributor equipment on the customer's premises.

(f) The connection point.

(g) The location of the point of supply.

(h) The position of the point of attachment of an overhead service to any building, pole or structure (the customer may negotiate the position with the electricity distributor where feasible to do so).

(i) The property boundary entry of an underground service and the enclosure of the service cables.

Access to the service and termination points must be readily available.

Where alterations or additions are being carried out on an electrical installation, existing services, consumers mains and service and metering equipment must be replaced (by the customer) to comply with these Rules, where their current carrying capacity is exceeded by the maximum demand determined in accordance with AS/NZS 3000.

Information is provided on the electricity distributor requirements in the relevant Sections of these Rules.

1.5.2 Advice to Contractors

The customer/contractor is required to initiate and make arrangements for services and service and metering equipment, including the location of:

(a) Service and metering equipment.

(b) Connection point.

(c) Point of supply.

(In accordance with these Rules).

For electrical installations on railway land contact RailCorp. Refer to clause 1.2.18.

1.5.3 Services

The electricity distributor may require the customer to do any of the following:

(a) Supply and install an overhead or underground service.

(b) Provide for attachment of an overhead or installation of an underground service.

(c) Provide for more than one connection point if the electricity distributor considers it necessary. (e.g. to avoid interference with supply to any other customer).

The electricity distributor may, upon a customer's formal application, provide a service to an electrical installation.

The terms and conditions of the service arrangements may include the need and cost, if any, to extend or reinforce the existing distribution system and the coordination of these activities.

Customers are required to give adequate notice of electricity supply requirements so that the electricity distributor can meet the customer's schedule.

1.5.3.1 Minimum Insulation Resistance

The insulation resistance between conductors and between conductors and earth of new services shall not be less than 50 megohms when tested using a 500V DC insulation resistance tester.

1.5.3.2 Number of Services

Only one connection point will be provided to each electrical installation. A strata title development will normally be considered as one installation. The electricity distributor may vary these arrangements.

An electricity distributor may allow more than one electricity network connection per installation if the distributor considers that to do so would be sound engineering practice after taking into account any or all of the following:

(a) The magnitude of the customer's load;

(b) The distance between 'sub installations' within an installation;

(c) The nature of the customer's activities

(d) The site conditions; and

(e) The ongoing segregation of the separate parts of the installation.

The customer may be required to pay the cost involved in providing an additional supply. Before starting work, the electricity distributor must be consulted.

1.5.3.3 Number of Phases

The number of phases required to supply an installation must be determined by:

(a) The maximum load permitted by the electricity distributor in accordance with Table 1.1; and

(b) The load characteristics of customer's equipment, eg three phase motors, instantaneous water heaters, 400V welders, large heat/air conditioning loads.

Table 1.1: Allowable Number of Phases

Maximum Demand	Number of Phases
Not exceeding 100 A	One phase and neutral
Exceeding 100A	Two or three phases and neutral
A motor exceeding 2.0 kW	Three phases and neutral

Note: Determine the maximum demand in accordance with AS/NZS 3000 for consumers' mains and submains.

1.5.3.4 Voltage Drop

The voltage drop in the overhead or underground service should not exceed 3% of the nominal voltage at the connection point, unless approved by the electricity distributor. The voltage drop must be calculated using the maximum demand of the consumers mains. Determine the maximum demand in accordance with AS/NZS 3000 for consumers' mains and submains.

1.5.4 Overhead Service

The overhead service terminates at the point of supply. This is at the first support on the customer's premises, however, the electricity distributor may nominate an alternative point on the customers premises, e.g. if a service does not originate on a public road or future undergrounding of the street mains is planned.

Section 3 provides details of requirements for overhead services including:

(a) Determination of the route of the overhead service.

(b) Means of support required to satisfy cable sag, tension and clearance requirements.

(c) Termination and connection of the service to the electrical installation.

The electricity distributor ensures maintenance of the overhead service, including service support(s) is carried out on the customer's premises. The customer will be responsible for:

(d) Installation and maintenance of any support to the electricity distributor's requirements for the overhead service that is on the customers premises.

Note: The customer may make arrangements with the electricity distributor or an authorised accredited service provider for the maintenance of a private pole on the customer's premises.

(e) Installation and maintenance of any aerial consumers mains that are connected to the overhead service.

(f) Maintenance of required clearances between the overhead service and trees, vegetation on customer's premises (except in certain circumstances).

(g) Maintenance of required clearance between the overhead service and any building, structure or ground on the customer's premises.

(h) Installation and maintenance of the electrical installation which originates at and includes the point of supply.

1.5.5 Underground Service

The underground service terminates at the point of supply. This is a termination pillar or facility, or the main switchboard located on the customer's premises. Refer to Figure 1.2.

Section 2 provides details of requirements for underground services including

(a) Underground installation requirements.

(b) Termination and connection of the service to the electrical installation.

The electricity distributor must ensure maintenance of the underground service is carried out.

The customer is responsible for the installation and maintenance to the electricity distributor's requirements, of any conduit or structure and equipment which is required to be located on their premises for the installation and connection of an underground service.

In addition, the customer must provide and maintain satisfactory access to the conduit or structure to avoid any unnecessary delay and inconvenience should work have to be carried out on the underground service.

The costs of excavation or reinstatement of finished surfaces (driveways, paths, etc) or demolition and reconstruction of civil works on the customer's premises - to enable the electricity distributor to gain access to the underground service to effect any future repairs - must be borne by the customer.

1.5.6 Underground Service Connection to an Overhead Distribution System (UGOH)

1.5.6.1 Provision for Future Underground Distribution System

In existing overhead distribution areas, the electricity distributor may require the provision of transition arrangements to provide for future undergrounding of street mains and services. In such cases, the arrangement will be deemed to be a combined overhead and underground service. Refer to Figure 1.1(c).

1.5.6.2 Underground Supply from Overhead Distribution System (UGOH)

If the customer requests an underground service, it may be provided from the overhead distribution system. The underground service may be provided by an underground to overhead connection at a suitable existing electricity distributor pole. Refer Figure 1.1(d) and Section 2 for further information on this arrangement.

1.5.7 Special Small Services

Special small services refers to an overhead or underground service to connect supply to certain small electrical installations, usually located in public places eg bus stop shelters, public conveniences, floodlights, decorative lighting, locality signs, public telephones etc.

Section 5 provides the detailed requirements for special small services.

1.5.8 Special Situations

The following situations require special consideration. Consult the electricity distributor for advice.

Historic - Consult the owner or the gazetted authority if a building or an environment feature has, or appears to have, historical significance. Do this before carrying out any work.

Isolated or Rural Areas - Special conditions may apply to the provision of supply to these areas.

Old City Districts - You may have to consider alternative methods of supply for old buildings.

Public Facilities - Services to public facilities (e.g., telephone cabinets, public conveniences, display lighting and traffic lights, etc) usually require special agreements with the electricity distributor.

Shopping Centres - If alterations are required to existing supply arrangements, the customer should contact the electricity distributor for information on whether an overhead, a facade mounted, or an underground supply will be provided.

1.5.9 Installations on Railway Land

Special conditions apply to services, service and metering equipment (and electrical installations) on railway land due to:

(a) Ownership of the land by the railways.

(b) Special railway operational requirements due to running trains.

(c) The overhead wiring traction system in the railway 1500V dc electrified track area (refer clause 1.2.18).

RailCorp is the electricity distributor for all electrical installations on railway land in the railway 1500V dc electrified track area, due to special earthing, bonding and isolation requirements necessitated by the 1500V dc traction system.

It is also the electricity distributor for customers in other areas who are supplied from its high voltage distribution system (refer clause 1.2.18).

In the railway 1500V dc electrified track area RailCorp provides electricity supply via its own high voltage distribution system, or obtains electricity supply from the local electricity distributor and establishes a small low voltage distribution system which includes a special isolation transformer to isolate the local electricity distributor's MEN earthing system.

In certain cases a changeover contactor is provided with the normal supply being provided from RailCorp's high voltage distribution system and the back-up supply originating from the local electricity distributor but conveyed on railway land via the small RailCorp low voltage distribution system as detailed above.

Due to the 1500V dc overhead wiring traction system, RailCorp does not use the MEN earthing system. Instead, they use a modified direct earthing system, which incorporates a reticulated insulated earthing conductor.

All applications for electricity supply in the railway 1500V dc electrified track area are to be made in writing to RailCorp, which will provide details of special conditions on receipt of application.

In the non-electrified track area, whilst electricity supply will normally be from the local electricity distributor (and a special isolating transformer is not required), applications must be made in writing to RailCorp to obtain approval for the proposed route along with details of any special conditions that will apply for the service where it is on railway land.

Refer to clause 1.10.7.1 for special earthing requirements for electrical installations.

Refer to Section 3 of these Rules regarding special requirements for overhead services, and Section 2 regarding special requirements for underground services.

1.5.10 Service and Metering Equipment

The electricity distributor will require the customer to provide and install service and metering equipment on the customer's premises.

For service and metering equipment refer to Section 4, which provides details of the requirements.

1.5.10.1 Current Transformer Metering

Where the maximum demand of an installation or separately metered portion of an installation is determined by the electricity distributor to be in excess of 100A per phase, it will be necessary to use meters which operate in conjunction with current transformers.

Refer to Section 4, which provides details of current transformer metering arrangements.

1.5.11 Alterations and Additions

Alterations, additions, or upgrading of existing;

(a) Overhead service/underground service

(b) Service and metering equipment,

must be carried out to comply with these Rules.

1.5.12 Communications

The electricity distributor may require the customer to provide for the installation of communication equipment for remote meter reading, energy control or other purposes.

1.5.13 Accommodation of Electricity Distributor's Substation Equipment

The electricity distributor may decide the supply of electricity required by a customer is too large to be provided by a service from its low voltage street distribution mains. The electricity distributor may require transformers, switchgear and other distribution equipment to be installed on the customer's premises. This may also arise when the customer takes supply at high voltage.

The electricity distributor will, in such circumstances, require the customer to provide a place within the premises to accommodate the transformers, switchgear and other equipment free of cost.

The place provided must be:

(a) Considered suitable by the electricity distributor.

(b) Enclosed in a manner approved by and at no cost to the electricity distributor.

(c) Provided with satisfactory arrangements for access and tenure.

The electricity distributor may want to use the equipment to supply other premises. It may install additional equipment within the enclosed place to supply other premises.

1.6 PAYMENTS FOR EQUIPMENT AND SERVICES

In accordance with the Electricity Supply Act 1995 and customer connection contract, the electricity distributor may require a customer to pay:

(a) For the supply, installation, connection and maintenance of overhead or underground services, service and metering equipment.

(b) For the alteration of supply arrangements due to a customer request or to rectify a contravention of the electricity distributor's requirements.

(c) A contribution towards the extension or alteration of the distribution system to accommodate the customer. Refer to clause 1.6.1.

Electricity distributors must also comply with IPART determinations on capital contributions (including associated miscellaneous charges) and recoverable works. Refer to the IPART website for capital contribution determination. Subject to the requirements of the IPART determinations, electricity distributors may establish and publish prices, terms and conditions, if any, for the above work.

1.6.1 Extension or Alteration of Distribution System

The distribution system at the intended connection point may not be capable of supplying the customer. Alterations may be necessary where the customer intends to install an electrical load that, because of its size, may affect the quality of supply to other customers. Extensions generally apply where the electrical installation is a considerable distance from the existing distribution system.

Where the existing distribution systems are single phase, three phase loads would require an extension of the distribution system and an upgrading of a transformer.

These conditions may necessitate work to alter, extend or upgrade the distribution system.

Customers therefore need to apply to electricity distributors so that arrangements can be determined.

1.6.2 Contestable Work

Details of the competitive process are given in the Code of Practice Contestable Works. Clause 1.7 provides further information on the accreditation and authorisation for Level 2 accredited service providers.

1.6.3 Avoid Premature Expenditure

A person who wishes to connect an installation to the electricity distributor's distribution system or increase the capacity of an existing connection must complete an Application for Connection form (AFC).

Customers are advised not to make commitments or payments (eg contractual arrangements), for designs, materials or works until they receive advice from the electricity distributor about the terms and conditions of the customer connection and customer supply contracts that will apply to the supply of electricity.

The customer should consider the possibility of the load exceeding the proposed arrangements and make allowances to avoid future upgrading costs.

1.7 ACCREDITATION AND AUTHORISATION FOR LEVEL 2 ACCREDITED SERVICE PROVIDERS

The Electricity Supply Act 1995 specifies requirements relating to the provision of customer connection services and allows customers to choose the supplier of those services which it funds. These are contestable works. (Refer to the Code of Practice – Contestable Works).

The work is subject to the electricity distributor's design, construction and installation standards and can only be performed by an accredited service provider chosen by the customer.

1.7.1 Accreditation

Accreditation is intended to facilitate the outcomes outlined in the Code of Practice – Contestable Works as follows:

(a) The works comply with the electricity distributor's requirements.

(b) Persons undertaking the works are suitably trained and qualified.

(c) Connections to the distribution system are only performed by individuals authorised by the electricity distributor.

(d) In compliance with the electricity distributor's Safety and Network Management Plan and Customer Installation Safety Plan.

(e) The safety, reliability and efficiency of customer connection services.

There are three levels of accreditation.

Level 1: Permits work on the electricity distributor's distribution system that is contestable work associated with connection of a customer's development.

Level 2: Permits contestable customer connection work between the connection point and the point of supply and at the main switchboard (including metering services). These Rules apply principally to Level 2 accreditation.

Level 3: Accreditation relates to the associated design work.

Accreditation is granted by Fair Trading in accordance with its accreditation scheme. This accreditation is valid within the distribution areas of the electricity distributors who adopt this scheme (this currently applies to all of NSW). Alternatively, the electricity distributor may choose to adopt its own equivalent scheme in which case application should be made accordingly.

1.7.2 Authorisation

Individuals working for accredited service providers or sub contractors of accredited service providers must be appropriately authorised in writing by the electricity distributor to undertake works on or near the electricity distributor's distribution system.

Authorisation is required for individuals performing the following work:

(a) Connection of an electrical installation to the electricity distributor's distribution system or service at the connection point or at the point of supply.

(b) Disconnection or reconnection of an electrical installation at the connection point, point of supply, service fuse, meter, link or other equipment.

(c) Installation, connection, disconnection or adjustment of equipment which has been sealed by the electricity distributor or is required to be sealed.

(d) Working on or near equipment such as, service and metering equipment, service pillars, posts or structures, or lamp fittings that are the electricity distributor's property.

At the completion of the work the accredited service provider must perform tests on all work carried out to ensure its safe operation before connecting it to the distribution system. These tests must include polarity, phase rotation (where applicable), insulation resistance and earthing integrity. The tests will include both visual and instrument checks.

The main switch(es) must be sealed in the OFF position with a suitable tag(s) which only the customer's contractor (which may also be the accredited service provider) who tested the electrical installation may remove.

The accredited service provider must not energise the installation past the main switch unless they are in possession of a copy of the relevant notification of electrical work being carried out in accordance with requirements of the Electricity (Consumer Safety) Regulation 2006 or have completed such a document indicating all tests required have been performed.

Energising of the electrical installation past the main switch(es) is the responsibility of the customer's contractor.

1.8 NOTIFICATION OF SERVICE WORK

The accredited service provider must complete a notification, in the format required, that service work has been carried out. The notice is to be forwarded so as to be received by the electricity distributor within two working days of completion of the work.

The notice must include:

(a) The customer details.

(b) The scope of the work performed.

(c) The test results.

(d) The accredited service provider's details.

(e) The installing and testing authorised person's details.

(f) The meter equipment information.

(g) A plan showing the details of the service route.

(h) National Metering Identifier (NMI), where this has been provided by the electricity distributor.

Contestable works include:

i) Installation and connection of new overhead or underground services.

ii) Disconnection/reconnection of overhead or underground service at the connection point.

iii) Disconnection/reconnection of an overhead service at the point of supply.

iv) Disconnection of an underground service at the connection point.

v) Installation or replacement of service and metering equipment.

vi) Energising new installations.

1.9 CONNECTION AND DISCONNECTION OF ELECTRICAL INSTALLATIONS

Legislation requires that electrical installations must comply with relevant safety standards at the time of connection and remain safe while connected to supply.

Disconnection by the electricity distributor is possible if the contract conditions are not satisfied, but only after reasonable notice is given under customer connection or customer supply contracts.

The electricity distributor's Customer Installation Safety Plan should be referred to for ensuring the provision of safe electrical installations.

1.9.1 Availability of Supply Capacity

Customers should give notice as specified by the electricity distributor of their supply requirements so that the appropriate arrangements can be made. This particularly applies where a customer intends to install items of equipment which:

(a) Place significant electrical loads on the electricity distribution system.

(b) May affect the quality of electricity supply to other customers.

Failure to apply in writing to the electricity distributor may result in delays for connection.

It may be necessary to reinforce the electricity distribution system or impose special conditions or restrictions to the operation and use of the equipment prior to any upgrading work that may be necessary to ensure satisfactory operation of the equipment.

Application must be made in writing to the electricity distributor by way of an Application For Connection (AFC) form for the provision of customer connection services and supply of electricity to electrical installations:

i) Where the maximum demand for new or alterations exceeds 100A for single phase installations.

ii) Where the maximum demand for new or alterations exceeds 63A per phase for three phase installations.

iii) All rural installations zoned non-urban.

iv) Where the premises are in isolated or undeveloped areas.

v) New or redeveloped multi-residential installations.

vi) Special small services.

vii) New or altered CT installations.

viii) Alternate supplies.

ix) Installations containing air-conditioning without assisted start.

x) On railway land in the railway 1500V dc electrified track area, refer clause 1.2.18. The application is to be sent to RailCorp.

xi) Or as directed by the electricity distributor.

1.9.2 Connection to Supply

Under the Electricity Supply Act 1995 a person who owns or occupies premises must apply to the electricity distributor to obtain approval for the provision of customer connection services to those premises. Refer to clause 1.6.3. Such services must be provided under a relevant customer connection contract.

Connection services to customers' premises may only be provided by accredited service providers and their individual employees, as authorised by the electricity distributor.

1.9.3 Permanent Disconnection and Removal of Supply

Only suitably accredited and authorised service providers are permitted to carry out the permanent disconnection and removal of:

(a) Overhead and underground services.

(b) Metering equipment (excluding contestable market metering).

(c) Load control equipment (owned by the electricity distributor)

from customers' premises.

The accredited service provider must consult with the electricity distributor for each proposed job for its procedural requirements and formal permission to proceed.

The accredited service provider will need to forward to the electricity distributor a written request from the owner and written agreement from the occupier (customer) if not the owner. If the customer is non-franchise then the written agreement of their retailer (if not the electricity distributor) must also be forwarded.

Following disconnection, the accredited service provider must return to the electricity distributor:

i) Recovered overhead service/ underground service unless other arrangements are made with the electricity distributor; and any

ii) Recovered metering equipment belonging to the electricity distributor; and

iii) A completed Notification of Service Work (NOSW) form.

Non franchise customer metering equipment must be returned to the accredited meter provider.

1.9.4 Safe Installation

The Electricity (Consumers Safety) Regulation 2006 requires that installation work on a electrical installation must:

(a) Be compliant with AS/NZS 3000 the Wiring Rules.

(b) Not be commissioned unless the electricity distributor has permitted the connection to its distribution system.

(c) Be tested before commissioning for safe operation and compliance with AS/NZS 3000 by a person authorised under the Home Building Act 1989 to do electrical wiring work without supervision.

(d) Be recorded and notified to the electricity distributor and the owner of the electrical installation within 14 days of:

i) Commissioning any installation work; and/or

ii) Completion of any safety and compliance tests.

(e) Be maintained so as to ensure that:

i) The safe and satisfactory operation of the installation is not impaired by interference or damage; and

ii) The live parts of the installation remain properly insulated, or protected against inadvertent contact with any person; and

iii) The installation is not used in a manner that exceeds the operating limit imposed by the design or installation.

The electricity distributor may permit the connection of any installation work associated with alterations or additions to an existing installation, including submains and final sub circuits originating at a main switchboard, provided the conditions of clause 1.3.4 of these Rules are met.

Such permission would not include any installation work:

(f) Forming part of a high voltage installation

(g) Located within a hazardous area, or

(h) Where the work causes supply of electricity to be incorrectly metered.

The electricity distributor reserves the right to cancel this permission where serious or repetitive breaches of the legislation and these Rules are committed.

1.9.5 Bush Fire Management

The NSW electricity distributors are required to prepare a Bush Fire Management chapter of their Network Management Plan in accordance with the Electricity Supply (Safety and Network Management) Regulation 2008.

Clause 12 (2) (e) of the Bush Fire Management Chapter relates to private overhead lines located in bush fire prone areas, their inspection, testing and maintenance, and the provision for the enforcement of any standards. This plan may provide for the disconnection of any unsafe installation where there is a bush fire risk. Copies of these plans are available from the local electrical distributors.

1.9.6 Inspection

Where the electricity distributor performs an inspection, including any tests as part of the inspection, the assessment is limited to what can be observed or checked. This will depend upon the state of completion of the installation and does not guarantee that the work complies with standards in every respect.

1.9.7 Disconnection

As a result of its inspection, the electricity distributor may disconnect, refuse to connect, or plan to disconnect supply to the installation or parts thereof that contravene AS/NZS 3000 or relevant installation provisions of these Rules.

When this occurs the electricity distributor will give written notice to the customer and/or the customer's contractor advising of the contravention or defect.

If the defect creates dangerous situations, the electricity distributor will take immediate disconnection action. For defects of a minor nature the electricity distributor may allow connection subject to rectification being completed within a period stated in the written notice.

The electricity distributor may also disconnect or discontinue supply with reasonable notice to a customer for a breach of the customer connection or supply contract.

1.10 PROVISION FOR CONSUMERS INSTALLATION

1.10.1 Advice to Customers

Customers should obtain advice about the terms and conditions that will apply to the connection and supply of electricity before they incur any expenditure or enter into any contract. Refer to clause 1.6.3.

1.10.2 Limits on the Connection and Operation of Equipment

1.10.2.1 General

The equipment in a electrical installation must be arranged and operated so as to minimise or prevent adverse effects to the distribution system and other electrical installations connected to the distribution system.

The effects may be considered under the following categories:

(a) **Excessive fluctuations** - equipment which would cause excessive voltage disturbances on the distribution system as a result of large or fluctuating load demands, eg arc furnaces, welding machines, x-ray units, frequently started motors including air conditioning equipment. Must comply with AS/NZS 61000.3.3 or AS 61000.3.5 and AS/NZS 61000.3.11.

(b) **Excessive distortion** - equipment which would cause excessive distortion of the supply wave shape, eg rectifiers, frequency converters, electronic load control devices, saturable reactors. Must comply with AS/NZS 61000.3.2, AS/NZS 61000.3.4 and AS/NZS 61000.3.12.

(c) **Interference with frequency load control system** - equipment which would adversely affect the electricity distributor's load control equipment: eg shunt capacitors used in power factor correction of fluorescent lighting.

The customer should take particular care to check that equipment in these categories complies with the limits and conditions imposed by the electricity distributor.

The electricity distributor may refuse to permit the connection of equipment if it considers that the electricity supply to other customers would be adversely affected.

Note: Clauses 1.10.2.3 to 1.10.2.5 provide limitations and exceptions that are generally considered acceptable.

1.10.2.2 Corrective Action

Where a customer's equipment creates undue interference and adversely affects the supply to other customers, the electricity distributor will require the customer to take corrective action. The customer must comply with this clause even if the electricity distributor has approved the connection of the apparatus or equipment causing the interference. This may involve the imposition of requirements which are more stringent than the general limitations given under clauses 1.10.2.3 to 1.10.2.5.

In this situation, and others where there may be doubt as to the effects of particular equipment connected, or intended to be connected, to supply, the customer should seek professional assistance.

1.10.2.3 Limitations - General

The equipment may be restricted by the change in current that occurs when the equipment is switched on and off or between other operational settings. The magnitude and frequency of the current changes are important factors. Table 1.2 provides a guide to limits that may be applied to equipment other than motors which are covered in clause 1.10.2.4.

Table 1.2: Guide to Limits to Current Changes for Equipment Other than Motors

				Limit Applying to Changes of Line Current (A)	
Equipment Voltage (V)	**Connection of Load**	**Switching Arrangements**	**No. of Phases of Supply**	**Fluctuating or Intermittent (four or more changes per hour)**	**Continuous or Steady (less than four changes per hour)**
230	Line to Neutral		1	15	25
230	Line to Neutral	Phases not switched simultaneously	2 or 3	15	25
230	Line to Neutral	Phases switched simultaneously	2 3	25 30	25 50
400	Line to Line (no neutral connected)	Phases switched simultaneously	3 2	30 45	50 50

Notes to Table 1.2

1. Equipment having "Fluctuating or Intermittent" line current changes includes welders, heating units controlled by thermostats or energy regulators, and repetitively switched machines eg, X-ray units.
2. A number of individual appliances which are likely to be controlled by one switching operation eg, space heating installations, illuminated tennis courts etc. must be regarded as one appliance.
3. Some equipment may be exempted from Table 1.2. See clause 1.10.2.5 Exemptions and Special Considerations.

1.10.2.4 Limitations - Motors

The starting current of motors, which is significantly higher than running current, can cause a significant fluctuation of the supply voltage. Motor installations with associated starting/control devices must be designed to ensure that the starting current will not cause the reduction in voltage measured at the point of supply to exceed 5% for more than 20 milliseconds.

Table 1.3 provides a general guide for different types and uses of motors.

In areas limited to 230/460 volt supply, contact the electricity distributor for advice on special supply arrangements.

Table 1.3: Limits of Motor Starting Currents

Motor Type	Starting Current (A)
Single Phase, 230V	45
Three phase 400V Domestic	53
Three phase, 400V non Domestic	3.3k + 53
Three phase, 400V lift motor	200
Three phase, 400V fire and smoke control equipment	1.5(3.3k+53)

Note: k = the continuous output rating in kW of the largest motor in the installation or group of motors that are started simultaneously.

1.10.2.5 Exemptions and Special Considerations

The electricity distributor may agree to the connection of equipment which does not meet the general limitations provided in Tables 1.2 and 1.3.

Equipment that may be exempted or be suitable for special consideration may include:

(a) Storage and instantaneous water heaters.

(b) Controlled load tariff equipment, where supply is only available during certain off peak hours.

(c) Appliances incorporating motors which are switched with another load component, provided that:

  i) The total change in line current does not exceed the motor starting current limit of Table 1.3; and

  ii) The change in line current attributable to switching load other than the motor does not exceed the limit of Table 1.2.

(d) Motors which are not frequently started and which the electricity distributor has assessed as being able to be supplied without creating undue interference.

An installation may be less susceptible to creating adverse effects where it:

(e) Is connected to a low impedance distribution system as may be found in urban areas; or

(f) Is in the proximity of, or directly connected to, an appropriate size substation; or

(g) Incorporates substantial power factor correction facilities.

Customers who consider their equipment and installation to merit special consideration should contact the electricity distributor prior to implementing any changes.

1.10.3 Balancing of Load

The loading of an installation, or a separately metered part of an installation, which is supplied by more than one phase, must be arranged so that the maximum demand in an active service conductor is not more than 25A above the current in any other active service conductor.

The total current in the service neutral conductor of a three phase supply must not exceed the highest simultaneous current in any active conductor, including the effects of harmonic currents.

The electricity distributor may agree to other limits.

1.10.4 Protection from prospective short circuit currents

The electrical installation must be designed and installed so that it will perform satisfactorily under all fault conditions.

In determining the suitability of equipment for use at 230/400 volts supplied from a distribution system, the nominal prospective short circuit current at the connection point for services up to 400A will be as follows:

(a) Suburban residential areas: 10 kA.

(b) Commercial and industrial areas: 25 kA.

(c) Installations on railway land supplied by RailCorp: 6 kA.

For switchboards greater than 400A refer to clause 4.17.2.

In certain circumstances lower or higher values may apply eg, rural areas and direct connection at a substation. In these cases, and in the case of supply at high voltage, the electricity distributor will advise the customer on the appropriate conditions in writing.

1.10.5 Coordination of Protective Devices

The protective devices forming part of a electrical installation should operate in such a manner that a fault in the installation is unlikely to activate protective devices installed in the distribution system. In order to achieve this, the electricity distributor will require all protective devices to be coordinated or graded with the service protective device(s).

Refer to Section 4, which provides the requirements for low voltage switchboards rated above 100A.

1.10.6 Sealing/Locking

The customer must provide for the fitting of seals or locks to service and metering equipment, or to parts of the electrical installation. The provision must be approved by the electricity distributor. Seals or locks must be affixed in circumstances where they are necessary in the opinion of the electricity distributor. These circumstances may include the need to:

(a) Prevent obstruction or diversion of the supply of electricity.

(b) Avoid interference with the supply to other customers.

(c) Secure the control and metering of the electricity supply.

(d) Cater for any other purposes relating to the agreement with the customer.

In general, sealing or locking is required for all connections on the line side of the meters and certain other connections associated with metering.

Refer to Section 4 which provides details for sealing and locking methods.

1.10.7 Earthing

New electrical installations, and alterations or additions to existing installations must be earthed using a Multiple Earthed Neutral (MEN) system complying with the requirements of AS/NZS 3000.

The main earthing conductor or a bonding conductor must not be connected to the service neutral link or bar. The MEN connection must be made at the first downstream consumers neutral link. All subsequent consumers neutral links installed at the service position/main switchboard must originate from the first downstream consumers neutral link (at which the MEN connection is established).

Exceptions may arise in high voltage installations, mining or similar large outdoor installations.

For specialist applications the electricity distributor must be consulted on proposals for alternate earthing methods.

1.10.7.1 Earthing Installations on Railway Land

Electrical installations on railway land in the railway 1500V dc electrified track area (refer clause 1.5.9) are to be earthed (using a modified direct earthing system) by connection to a terminal nominated by RailCorp and in accordance with RailCorp special isolation, earthing and bonding requirements, in particular:

(a) Provision of a service earth link when nominated.

(b) No earth to neutral connection to be made by the customer.

(c) No separate electrical installation earth electrode to be installed.

(d) Special minimum size for earthing and bonding conductors; and

(e) Mechanical protection requirements.

Details will be provided by RailCorp on application.

1.10.8 Installations with Switchboards rated above 100A

Low voltage customer switchboards with ratings of more than 100A per phase may be subject to additional electricity distributor requirements. The customer must not proceed with work until they know:

(a) The requirements for service and metering equipment.

(b) The electricity distributor's planning requirements.

Refer to Section 4, which provides the requirements for low voltage switchboards rated above 100A and metering arrangements.

1.10.8.1 Control of Incoming Supply

Facilities complying with the requirements of AS/NZS 3000 must be provided on the customer's main switchboard to isolate all portions of the electrical installation from all possible sources of supply.

Apply to the electricity distributor for its requirements on the use of bus-couplers where multiple supplies are available.

1.10.8.2 Multiple Supplies

Where the electricity distributor agrees to provide an electrical installation with more than one supply, the customer must ensure the supplies are not paralleled within the installation.

In general, where a single switchboard is supplied from more than one transformer, and the electricity distributor does not permit the paralleling of supply transformers, each transformer must be connected to a separate section of the busbar.

The provision of bus section couplers to interconnect the separate sections of the busbar is optional provided such couplers are:

(a) Installed and connected on the line side of the electricity distributor's metering equipment.

(b) Installed at the customer's cost.

(c) Under the electricity distributor's control.

(d) Provided with facilities for locking in the "off" position by means of the electricity distributor's security lock. Locking facilities must accept a 10mm diameter shank. The lock must be provided at the customer's cost and will remain the property of the electricity distributor.

Where a bus section coupler is provided, a warning notice with permanently engraved white letters, 6mm high and on a red background, must be fixed adjacent to the lock at the bus section coupler. The warning notice must read:

WARNING - THIS COUPLER IS CONNECTED ON THE LINE SIDE OF THE INSTALLATION MAIN SWITCHES.

Where off-load isolators are used as the bus section couplers, an additional engraved label must be fixed at the point of operation to indicate that the isolator must not be operated under load.

1.10.9 Identification

The electricity distributor requires marking on electrical installations to identify the purpose and relationship of equipment. The marking may be in addition to that required by AS/NZS 3000 where:

(a) Premises are subdivided into multiple occupancies with separate electricity supplies. The marking is used to identify the occupancy and the switchboard that supplies it. This will involve corresponding legible and durable marking at both the main entrance of the occupancy and the corresponding meter and distribution board, or switchboard.

(b) Installations are supplied by more than one service. The marking is used at the service and metering equipment and the main switchboards to identify the portion of the premises being supplied and the presence, location or operation of any alternative source of supply. In addition, a diagram showing the segregation arrangement must be attached to each main switchboard. All distribution boards must be labelled to indicate from which service they are supplied.

(c) Installations are supplied by RailCorp. The markings on the main switchboard must indicate that the installation is supplied by RailCorp.

Refer to Section 4 which provides a guide to acceptable equipment labelling and identification procedures for large installations.

1.10.10 Termination of Cables

The customer must provide suitable terminating devices if required and enough cable to allow termination at the connection point nominated by the electricity distributor.

If the proposed cable is not single core insulated and sheathed cable, you should check that it is suitable for termination to the electricity distributor's distribution system and equipment.

1.10.11 Power Factor Correction/Capacitor Installation

The customer must maintain the power factor of the electrical installation at a value not less than 0.9 lagging.

The electricity distributor may require metering of the installation, at an appropriate tariff, if the power factor of the supply taken by an electrical installation is such that either:

(a) The distribution system is not, or would not be used efficiently, or

(b) The supply to another customer is, or would be adversely affected.

The installation of power factor correction equipment, or in the case of the variation of any inductive load, must not:

(c) Cause the power factor of the installation to become leading at any time; and

(d) Adversely affect the operation of the electricity distributor's frequency injection load control system.

Refer to Section 6, which outlines requirements for installations which include capacitor power factor correction equipment.

1.10.12 High Voltage Installations

Application must be made to the electricity distributor for the installation of facilities which will enable the connection of a high voltage installation to the electricity distributor's distribution system.

Installations incorporating high voltage equipment must comply with the electricity distributor's requirements and its Safety and Network Management Plan.

Refer to Section 7, which provides further information on requirements for high voltage installations.

1.10.13 Private Generation

1.10.13.1 Standby Generation

Where the customer installs an alternative source of electrical supply, eg a standby generator, the proposed arrangements must be approved by the electricity distributor. Approval must be given for facilities to connect the alternative source of supply to the electrical installation normally supplied from the distribution system.

Where the electricity distributor agrees to the installation of facilities to enable an installation to be disconnected from the distribution system and connected to the alternate source, the systems must comply with the electricity distributor's requirements. They must prevent the electricity distributor's service and metering equipment and distribution system from being energised by the alternative source.

A notice must be fixed to the main switchboard and other affected switchboards to show:

(a) That the alternative supply facilities exist.

(b) Which section(s) of the installation they can supply.

(c) Their point of control.

(d) The conditions under which they may be operated.

Refer to Section 8, which outlines requirements for installations which include standby generation.

1.10.13.2 Parallel Generation

Application must be made to the electricity distributor for the installation of facilities which enable the connection of a privately owned generation plant to its distribution system.

Installations incorporating inter-connectable (parallel) generation must comply with the electricity distributor's requirements.

A customer requiring inter-connectable (parallel) generation will be required to comply with specific terms and conditions which may be incorporated in the customer connection contract.

The cost of designing, installing, operating and maintaining the private generating equipment is the customer's responsibility. Parallel operation of the generating equipment cannot commence until the electricity distributor gives written approval. The electricity distributor will advise of the conditions applicable.

Refer to Section 8, which outlines requirements for installations which include parallel generation.

1.10.14 Installations on Railway Land

Specific conditions apply to electrical installations on railway land.

Contact RailCorp for details refer clause 1.2.18.

1.10.15 Identification of Lighting Installations (not owned by an electricity distributor) in Streets, Parks or other Public Areas

The above lighting installations must have a clear and indelible sign attached to the outside of each light fitting (or lighting pole or standard if applicable) that indicates that it is Private Lighting. The sign shall also include the ownership and identify the origin of supply in accordance with AS / NZS 3000. The height of the lettering shall be a minimum of 20 mm.