

NP 007

Service Rules

This document should be read in conjunction with:

- NP 003 Installation rules
- NP 010 Meter Manual

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1. General

1.1 Scope

This Policy sets out the technical requirements relating to the connection of electricity installations to an electricity network operated by the Power and Water Corporation. Service Rules should be read in conjunction with the *Installation Rules* and the *Meter Manual*.

Reference should also be made to the Power Networks, Network Technical Code and Network Planning Criteria.

These Rules apply generally in respect of supply to premises in urban and rural areas. Where premises are in isolated, or undeveloped areas, other conditions may apply and the customer will be informed accordingly when an application for supply is made.

These Rules shall be deemed to incorporate the General Conditions of Supply. Further details regarding matters covered by these Rules are contained in the Regulations, and in the event of conflict the Regulations will prevail.

1.2 Definitions

Unless otherwise stated, the terms used in these Rules are as defined in the Wiring Rules and values of current and voltage are expressed as the Root Mean Square equivalent.

Act is the *Electricity Reform Act 2000*, and includes Regulations made under the Act.

Capacity means the rated demand applicable to a particular block of land or customer, and refers to an average demand over a 15 minute period.

Certificate of Compliance is a certificate issued by an Electrical Contractor certifying that work on an electrical installation has been carried out in accordance with the Wiring Rules (Australian Standard AS/NZS 3000) and the Service and Installation Rules.

Customer means a person who has made application for or who is supplied electricity.

Electricity Officer means an Electricity Officer appointed under the *Act*.

Low Voltage (LV) refers to supply at a nominal voltage of 230 volts or 230/460 volts single phase or 230/400 volts two or three phase +10% -2%. In accordance with changes to the voltage standard brought about by alignment with the international standard, Power and Water is moving towards a standard voltage range of $\pm 6\%$.

Manager is the Manager Network Engineering of Power and Water.

Notice of Intention is the "Notice of Intention to Carry Out Electrical Installation Work" as defined in this procedure.

Safety Regulator means the Electrical Safety Branch of NT Worksafe.

Service Equipment shall mean all electrical equipment installed in a premises by Power and Water including service lines, cables and busbars, and cabinets, meters, current transformers, filters, auxiliary control equipment, and temporary testing equipment.

Service refers to the low voltage overhead or underground line running from a pole or pillar owned by Power and Water, which crosses the property boundary of the block, and runs to the Point of Supply located on the block.

1.3 Exceptional Circumstances

In a number of Rules, it is indicated that the Manager may waive or modify the stated requirements. Any waive request shall be addressed in writing to the Manager and no action should be taken before receiving written approval.

1.4 Agreement to Pay Charges

Where the customer is required to pay a charge as provided for in Rules 2.3, 2.5, 2.7.2, 3.2.4, and 4.2.2.8, the customer shall, if requested, sign an agreement, written in a form acceptable to the Manager, before the work is commenced.

1.5 Failure to Comply with these Rules

In the event of the customer failing to comply with the requirements of these Rules, Power and Water may:

- disconnect the supply to the premises if it is considered hazardous, and/or
- report the matter to the Safety Regulator, who may prosecute the Contractor or customer.

Where supply is disconnected, a charge will be made for the reconnection of supply.

1.6 Warning against Premature Expenditure

Adequate notice of the customer's requirements should be given, 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.

Matters which may effect the design of a building project, such as the determination of the position of service equipment, the point of attachment for the service line or the point of entry of the underground service cable, and the position of any substation on the premises, should be settled at an early stage.

When contemplating the connection of equipment such as described in Rule 4.2.2.7, particular care should be taken to ascertain Power and Water's requirements relating to the prevention of interference with the supply to other customers.

1.7 Necessity for Employing a Licenced Person

The Electrical Workers and Contractors Act requires that any electrical wiring work be carried out by a person licensed under that Act. Severe penalties may be imposed by the Safety Regulator on unlicensed persons found to be carrying out electrical wiring work.

1.8 Damage to Power and Water's Equipment

The Electricity Reform Act and Regulations prescribe penalties for damaging or interfering with Power and Water's equipment. In addition, a customer may be held liable for damage to Power and Water's equipment installed on his premises (e.g., tree located on customer's land damaging overhead service). Power and

Water therefore recommends that the customer insure against the risk of loss or damage.

1.9 Standard Quality of Supply

Power and Water makes power supply available using good industry practice. Because of the nature of an electricity network, it is not possible to warrant any standard of reliability or quality.

1.10 Alterations to Installation

No addition or alteration may be made to an installation that increases load by a significant amount, without prior approval of Power and Water. Refer to the *Installation Rules* for details.

1.11 Interference with Equipment

No person may interfere with the service fuses, meters, maximum demand indicators, or any equipment sealed by Power and Water's officers (the *Act* prescribes severe penalties for such interference).

1.12 Damage to Meters or Service Equipment

In the event of any service main, and/or associated equipment, meter, maximum demand indicator, or other apparatus the property of Power and Water, and connected to the customer's installation, being destroyed, damaged, or lost, the customer shall, if required to do so by the Manager, pay the value thereof to Power and Water.

In cases where more than one customer is supplied from a common service, the cost of repairs, and replacements, may at the discretion of the Manager, and in such proportions as he may decide, be divided amongst the customers being supplied from such service at the time of its damage, loss, or destruction, and the customers shall pay to Power and Water the amount so decided by the Manager to be payable by them.

1.13 Inspection of Meters and Other Apparatus

The customer shall allow an Electricity Officer, carrying written authority, at any reasonable time, access to meters and other apparatus owned by Power and Water, for the purpose of inspecting, testing, repairing or removing the meters, or other apparatus, or for any other purpose connected with the supply of electricity as Power and Water may consider necessary. The customer hereby undertakes to disconnect the apparatus for such time as may be necessary during any inspection, test, or repair by Power and Water officers should such officers require the apparatus to be disconnected.

1.14 Interruption of Supply - Testing, etc

Power and Water reserves the right from time to time to disconnect without notice the supply of electricity at such times as it deems necessary, for the purpose of testing or for any other purposes connected with the efficient working of Power and Water's network.

1.15 Interruption of Supply - Interference

Where a Power and Water supply cable passes through or under private property, and it is interfered with so as to interrupt normal supply, Power and Water may refuse to reconnect such supply until the cause of the interference is removed.

Power and Water shall not be required to supply electricity to any premises where the supply cable passes through, under, or over, any other private premises, and Power and Water is unable for reasons beyond its control to ensure the

continuance of electricity supply through such cable.

1.16 Charge for Connection of Supply

Power and Water reserves the right to make a charge for connection of supply, in accordance with the *Network Capital Contributions Policy* and/or in accordance with the current Notice of Charges published in the N.T. Government Gazette.

1.17 Amendment of Service and Installation Rules

Power and Water may at any time vary, amend, or add to these *Service Rules*, or the *Installation Rules*. Notice of any variation, amendment, or addition shall be given by advertisement in at least two newspapers circulating in the Northern Territory. Such advertisements shall be sufficient notification of such amendment, variation, or addition, which shall on and from the date notified in such advertisement be deemed to be incorporated in and form part of these Conditions.

Nothing contained in these *General Conditions* shall prejudice the right or power of Power and Water under the *Electricity Reform Act 2000* or Regulations made thereof.

1.18 Further Information

The following pages provide details of the policy. If further information is required, please contact:

DARWIN

Customer Connection Officer

Power and Water
GPO Box 37471
Winnellie NT 0821
Phone (08) 8924 5700/02 Fax 89245363

ALICE SPRINGS

Regional Customer Connection Officer

Power and Water
PO Box 1521
Alice Springs NT 0871
Phone (08) 89517278 Fax 89517253

Submission of Notices of Intention and Certificates of Compliance:

DARWIN
PO Box 3596
Darwin NT 0801
1800 245 092
Ground Floor
Mitchell Centre
55 Mitchell Street

ALICE SPRINGS
PO Box 1521
Alice Springs NT 0871
Fax: (08) 89515418
Ground Floor
Greatorex Building
Cnr Parson & Bath Streets

TENNANT CREEK
PO Box 505
Tennant Creek NT 0861
Fax: (08) 89624395
Barkly House
99 Paterson Street

KATHERINE
PO Box 1045
Katherine NT 0851
Fax: (08) 89738982
Government Centre
First Street

PALMERSTON
Fax: (08) 89246592
C/- MVR Palm Plaza
University Avenue
Palmerston

2. Supply and Related Matters

2.1 System of Supply

The electricity supplied by Power and Water is in the form of alternating current of approximately sinusoidal wave form at a frequency of 50 hertz. The nominal supply voltage is 230/400 volts from a three phase, four wire system. In some outlying areas the supply is from a single phase 230/460 volts, three wire system.

Supply is also available at high voltage.

The neutral conductors of the supply system are connected to the general mass of earth, constituting a multiple earthed neutral (MEN) system as defined in the Wiring Rules.

2.2 Number of Services

Only one service will normally be provided to any one building or to any group of buildings on the one property. However, in some instances Power and Water may require more than one service to large premises. Power and Water may also permit two or more services if it is impractical for the property to be supplied from one. In such cases approval must be obtained in writing from the Manager prior to work commencing. Any conditions given in relation to segregation or signage must be complied with. Refer also to Installation Rule 5.63.

2.3 Special or Additional Services

Where exceptional circumstances warrant, the Manager may agree to a customer's request for the provision of a special or additional service. If granted, the customer shall pay the cost involved

2.4 Segregation of Supplies

Where more than one service is provided, each shall supply a separate and clearly defined portion of the premises without intermixture or electrical interconnection of the portions (either directly or by change-over facilities), unless otherwise agreed to by the Manager. Unless the additional service is provided to supply specific equipment, the whole of the installation in any defined portion of the premises shall be supplied from the same service. The customer shall affix labels at each main switchboard to define the areas or equipment it supplies, and to indicate the presence and location of other supplies. A label shall also be affixed to each distribution board to indicate the main switchboard from which it is supplied.

2.5 Temporary Supplies

The customer shall pay the cost of installing and removing a temporary service, mains or substation including any associated metering. Scheduled service charges also apply.

If later, the whole or part of the work becomes a permanent part of Power and Water's system of supply, the charge to the customer may be adjusted.

2.6 Sources of Alternative Supply

Where the customer installs an alternative source of electrical supply such as a stand-by generator, facilities for connection thereto of the electrical installation normally supplied from Power and Water's system shall not be installed unless the proposed arrangements have been agreed to by the Manager.

Reference should be made to Rule 4.5 regarding minimum requirements applicable to the customer's installation.

2.7 Substations on Customers' Properties

2.7.1 Accommodation

In order to supply large or isolated installations, it is generally necessary for Power and Water to install high voltage mains and substation equipment within the premises where the supply is required. This need arises when the anticipated demand of the premises is in excess of that which can be met from Power and Water's 230/400 volt mains in the vicinity and also when the customer takes supply at high voltage.

If it is necessary for Power and Water to extend or increase the capacity of its system in order to supply electricity to any premises, and if, in the opinion of the Manager such supply can best be given by installing transformers, switchgear, or other equipment on those premises, such supply will not be provided unless the customer provides, free of cost to Power and Water, a suitable space in the premises to accommodate the necessary equipment. The space shall be enclosed in a manner approved by the Manager, and the customer shall provide satisfactory arrangements for access and tenure.

Power and Water reserves the right to use all such equipment for the purpose of supplying other premises. Power and Water also reserves the right to install additional equipment for the purpose of supplying other premises.

2.7.2 Extension of High Voltage Mains to Substations on Customer's Premises.

Power and Water will supply, install, and maintain, the high voltage mains supplying a Power and Water substation on a customer's premises.

A charge will be made in respect of high voltage mains where they extend beyond a point that is nominated by the Manager.

Other charges may apply. Refer to NP 001.9.

2.7.3 Further Information

Further information relating to the establishment of substations on customer's premises is available from the Manager.

2.8 Determination of Number of Phases of Alternating Supply

The number of phases of low voltage supply which will be provided to an installation or separately metered portion of an installation, without incurring a charge in accordance with Clause (vi) of Rule 3.2.4, shall be as set out in Table 1.

The Manager may refuse to provide additional phases merely to supply instantaneous water heaters, 400 volt single-phase equipment such as welders, x-ray machines, three phase motors rated at 3.0 kW or less, or other polyphase equipment, if in his opinion 230 volt single phase equipment can satisfactorily perform the required function.

Table 1

Load Category	Number of Phases
Nominal load not exceeding 80A	1 Phase & Neutral (2 wire)
Nominal load exceeding 80A	3 Phase & Neutral (if available)*
Rating of largest motor exceeds 3.0kW	3 Phase & Neutral (if available)

* NOTE: Two phases and neutral may be permitted on individual application.

In some areas with 230/460 volt single phase supply, the load shall be balanced over both legs of the supply if 230 volt nominal load exceeds 80A.

The "nominal load" for the purpose of Table 1 shall be calculated on the assumption that all load will be connected line-to-neutral at 230 volts, and shall exclude polyphase instantaneous water heaters. The calculations shall otherwise be in accordance with the method set down in the Wiring Rules for the calculation or maximum demand in mains and sub – mains.

2.9 Balancing of Installation

The loading of an installation, or separately-metered portion of an installation, supplied from more than one phase, shall be so arranged that at the time of maximum demand of the installation the out-of-balance current shall not exceed 25 amperes, or 15% of the most heavily loaded phase, whichever is the greater. NOTE: An electrical installation comprising an individual appliance the load of which exceeds 60 amperes shall, if it is supplied with electricity by a polyphase supply, be balanced over all available phases.

3. Provisions for Service Equipment

3.1 General Requirements

The customer shall provide mounting and installation facilities for Power and Water's service equipment in the positions selected by Power and Water's officer. This equipment is supplied and installed by Power and Water and shall remain its property.

3.2 Connection to the Premises

Power and Water installs and maintains the connection between its system and the customer's installation. Power and Water's officer will determine whether the connection will be in the form of aerial service lines or underground service cables.

3.2.1 Aerial Service Lines

Power and Water's officer will determine the route of the service line and the position of the point of attachment to any building or structure. The customer shall provide, install, and maintain any support on private land for the service line and shall carry out any work, and provide and install any equipment required by Power and Water on such support, point of attachment or point of connection. Detailed requirements are set out in the Standards "Overhead Manual, Vol 1" and the *Installation Rules*.

The size of any service post or pole and the design of any bracket, or similar device used to raise the point of attachment shall be as determined by Power and Water's officer at the time of marking the service. Refer to the *Installation Rules* for details.

Power and Water will not accept responsibility for damage to the customer's premises resulting from normal tension in the service line, or causes beyond

Power and Water's control.

The customer shall be responsible for ensuring that trees and other vegetation growing on private property are kept trimmed to give a minimum clearance of 0.5 metres from any service line or aerial customer's mains, having regard to conditions existing due to strong winds which may cause trees or lines to sway.

3.2.2 Underground Service Cables in Designated Underground Areas

Power and Water's officer will determine the position of entry of the service cable at the property boundary and its route on the property. The customer shall provide, install and maintain a conduit or set of conduits, and any associated facilities required by Power and Water for the installation of the service cable. Detailed requirements are set out in Power and Water's "Underground Manual, Vol 2".

3.2.3 Connection to Service Equipment

Where the conductors are not stranded copper or they are of a size in excess of that which can be terminated on Power and Water's equipment, they shall be jointed to stranded copper cables suitable for termination on Power and Water's equipment. Aluminium conductors are not acceptable for termination directly on to Power and Water's equipment.

The customer shall also provide all inter-connecting wiring for Power and Water's metering and control equipment.

A person other than an employee of Power and Water shall not make any connection to, or disconnection from, conductors directly connected to Power and Water's supply system, or insert a conductor into any item of Power and Water's service equipment, except as authorised by the Manager.

3.2.4 Charges Applicable

The customer may be required to pay additional charges as determined by the Manager in respect of the installation of service equipment where:

- (i) There is excess of service line or underground service cable due to it being terminated at some point other than that nominated by Power and Water's officer.
- (ii) An aerial service line is in excess of one span or 20 metres in length from the point where it crosses the street alignment of the property. However, where Power and Water requires the customer to install a pole immediately inside the property solely to avoid the service line encroaching over an adjoining property, the portion of the service line on the premises within 20 metres of this pole is installed free of additional charge. In the case of single urban domestic premises, the whole of the first span commencing either at this pole or in the street is installed without additional charge.
- (iii) An underground service cable is in excess of 0.3 metres in length from a point nominated by Power and Water's officer on a street alignment or a property boundary.
- (iv) Busbars extend in excess of one metre from a point nominated by Power and Water's officer at the substation boundary.
- (v) Jointing and/or repair or replacement of customer's mains or underground

service cables is necessary on a customer's property.

(vi) The number of phases installed is in excess of the number determined in accordance with Table 1 of Rule 2.8.

(vii) The service is considered by the Manager to be temporary or additional.

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

NOTE: Refer to the *Networks Capital Contributions Policy* for application of non-refundable capital contributions.

3.3 Installations Suitable for use of the Standard Meter Box Panel

For single domestic and other nominated installations the customer shall provide and install a standard panel complying with Power and Water's requirements as detailed in the Meter Manual.

The panel shall be mounted in a standard meter box listed in the Meter Manual.

Information concerning drilling of the panel, height limitations, fixing of socket bases, wiring, the space available for the customer's equipment, and detailed requirements are set out in the Meter Manual. Rule 4.1 deals with the associated facilities to be incorporated in the customer's installation.

4. Customers' Installations

4.1 Facilities Associated with Metering

4.1.1 General

In addition to providing and installing a metering panel/s in accordance with Rule 3.3, the customer shall arrange to meet the requirements of Rules 2.7.6, 2.11 and 2.12 of the Meter Manual.

4.1.2 Multi-tenanted Commercial Installations – LV Metering

Each tenancy within a multi-tenanted installation shall be metered individually. House power for the installation may be metered through a separate meter.

4.1.3 Meters - Rental

Power and Water reserves the right to make a rental charge or request a capital contribution for any metering equipment installed at the request of a customer, which exceeds the standard required for metering the customer at the current tariff.

4.2 Limitation on Connection and Operation of Equipment

4.2.1 Rectifiers and other Non-linear Load

Switch mode and rectified power supplies shall be installed and operated so as to comply with the harmonic limits imposed by Australian Standard including, but not limited to, AS/NZS 61000 as follows:

Part 3.2 – Limits—Limits for harmonic current emissions (equipment input current less than or equal to 16A per phase)

Part 3.6 – Limits—Assessment of emission limits for distorting loads in MV and HV power systems – Basic EMC publication

4.2.2 Interference with Supply to Other Customers

Customer's equipment shall be arranged and operated to prevent undue interference with the supply to other customers. Voltage fluctuations at the Point of Common Coupling with other customers shall not exceed the limits imposed by Australian Standard AS/NZS 61000 as follows:

Part 3.3 – Limits—Limitation of voltage fluctuations and flicker in low-voltage power supply systems for equipment with a rated current less than or equal to 16A

Part 3.5 – Limits—Limitation of voltage fluctuations and flicker in low-voltage power systems for equipment with rated currents greater than 16A

If in the opinion of the Manager the customer's equipment is causing undue interference to the supply to other customers, the customer causing the interference shall take corrective action. The fact that Power and Water's officers connected and approved the apparatus or equipment causing the interference shall not exempt the customer from the responsibility to rectify the situation.

The customer's equipment or simultaneously switched groupings of equipment will generally be considered acceptable for connection if it complies with Rules 4.2.2.1 to 4.2.2.6 as appropriate.

4.2.2.1 General Equipment

Equipment other than motors shall comply with Table 2.

Table 2

Arrangement				Limit Applying to Changes of Line Current (amperes)	
Voltage	Connection	No. Phases	Switching Arrangement	Fluctuating or Intermittent (more than 4 changes per hour)	Continuous or Steady (less than 4 changes per hour)
230	Line-neutral	1		15	25
		2 or 3	Phases NOT switched simultaneously		
		3	All phases switched simultaneously		
400	Line-line	3	All phases switched simultaneously	30	50
	No neutral connection	2		45	

In Table 2 the term "fluctuating or intermittent" shall mean that the input current to the appliance changes in magnitude more than 4 times per hour, as occurs with the operation of welders, heating units controlled by thermostats, or energy regulators and machines such as X-ray units that are repetitively switched.

Where an appliance includes a motor that is switched simultaneously

with another load component, the total change of line current may exceed the limits shown in Table 2, but shall comply with Rule 4.2.2.3 for the starting of a motor of the same continuous rating as the appliance.

4.2.2.2 Storage Water Heaters

Notwithstanding the provisions of Rule 4.2.2.1, the change of line current caused by switching 230 volt heating units in storage water heaters arranged for single phase or two phase-connection may exceed 15 amperes, but shall not exceed 20 amperes.

4.2.2.3 Motors, General

Motor installations and any associated starting devices shall be so designed and operated as to comply with either of the following conditions.

(i) Fall in Voltage

The starting current shall not cause a fall in voltage of more than 5% for more than 0.02 seconds when connected to a typical 400/230 volt, 3 phase, 50hz supply system which for this purpose shall be considered to have the following impedance:

0.2 + j0.2 ohms (phase-neutral)

0.1 + j0.1 ohms (line impedance per phase)

(ii) Starting Current

The starting current shall not exceed:

40 amperes in the case of single phase 230 volt motors.

33 + (3.3 x k) amperes in the case of the 3 phase 400 volt motors; where k is the continuous output rating in kilowatts of the largest motor in the installation.

(iii) Large Installations

In large installations supplied exclusively by a customer substation, Power and Water may permit larger motor starting currents than permitted by 4.2.2.3 (ii) above. In such cases Power and Water will provide source impedance for calculation of voltage drop in 4.2.2.3(i) above, and may approve larger starting currents on application.

4.2.2.4 Motors Operating Lifts

Notwithstanding the foregoing, the starting current of a 3 phase lift motor shall not exceed 200 amperes

4.2.2.5 Motors Operating Fire-Fighting Equipment

The starting current of a 3 phase motor installation used solely for fire-fighting purposes may exceed the limit allowable under Rule 4.2.2.3, but shall not exceed 150% thereof.

4.2.2.6 Test Methods

For the purposes of Rules 4.2.2.3, 4.2.2.4 and 4.2.2.5 the following shall apply:

- (i) Fall in voltage shall be determined by the oscillographic or any other method considered suitable by the Manager.

- (ii) Starting currents shall be determined by the locked rotor method, with 230 or 400 volts, 50 Hz, as appropriate applied to the terminals of the motor installation. In the case of equipment having rotors that cannot conveniently be locked, the current may be measured by other methods considered suitable by the Manager.

4.2.2.7 Equipment Requiring Special Consideration

Power and Water may refuse to permit the connection of equipment in the following categories if it considers that by such connection, the supply to other customers would be adversely affected.

- (i) Equipment which would cause excessive fluctuation of voltage on Power and Water'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.
- (ii) Equipment which would cause excessive distortion of the wave shape of Power and Water's system voltage e.g., rectifiers, frequency converters, load control devices using thyristors or saturable reactors.

When contemplating the connection of equipment in these categories, the customer should take particular care to ascertain from Power and Water the conditions under which connection of such equipment will be permitted.

4.2.2.8 Exceptional Circumstances

Under certain circumstances, the Manager may agree to the connection of equipment that does not meet the requirements of Rules 4.2.2.1. to 4.2.2.5 or 4.2.2.7. Cases suitable for special consideration would include installations where motors are infrequently started, or where the supply system impedance is low, as in the central business district, or where the installation is in proximity to or supplied directly from a substation. Further information regarding this provision is available on request.

Where special approval is granted, the customer shall not cause any change to the starting conditions, magnitude or frequency of load switching, or the point of connection on Power and Water's system without obtaining the approval of the Manager. Any approval previously given shall be void if any of the foregoing conditions are changed.

Where the connection of such an appliance is dependent on Power and Water making an extension to its system, the approval will be conditional upon the customer paying any charge applicable.

4.3 Earthing

All installations required to be earthed shall conform to the requirements for the MEN System of Earthing as set down in the Wiring Rules.

4.4 Protection against Damage from Short Circuit

To meet the requirements of the Wiring Rules, the installation must be designed to withstand, without damage, the maximum currents that may occur under fault conditions, such as a short circuit.

Unless otherwise advised in writing by Power and Water's officer, the maximum (3 phase symmetrical) prospective short circuit current at the customer's terminals

where supply is at 230/400 volts from the street mains may be taken as:

- (i) Suburban residential areas - 6,000 amperes
- (ii) Commercial and industrial areas – 30,000 amperes

Lower values of prospective short circuit current will apply in installations that are remote from a substation, or supplied from a substation of small capacity.

Higher values of prospective short circuit current may apply where supply is direct from a substation of large capacity. In these cases, and in the case of supply at high voltage, customers will be advised of the value when the application for supply is dealt with.

4.5 Alternate Supply Sources

Where, in accordance with Rule 2.6, the Manager agrees to the installation of facilities to enable an installation to be disconnected from Power and Water's system and connected to a private alternative source of supply, such facilities shall be arranged by suitable interlocking procedures so that Power and Water's system and service equipment cannot be energised from such alternative source. A notice shall be fixed on the main switchboard to show that such facilities exist, their point of control, and the conditions under which they may be operated.

4.6. Power Factor

The power factor of every installation shall be maintained, as far as practicable, at a value not less than 0.9.

Power factor correction equipment shall be designed and maintained to prevent the power factor of the installation becoming leading.

The provision of Rule 4.2.2. should be noted if it is proposed to install capacitors.

4.7. High Voltage Installations

High voltage equipment shall not be connected to Power and Water's mains unless approved by the Manager, both with respect to its design and construction, and also with respect to its installation.

At the time of dealing with the application for supply, the Manager will advise the customer of the prospective fault current, and the normal range of voltage for which provisions should be made.

Relays, current transformers and other protective equipment must have characteristics to suit Power and Water's existing protection system. Power and Water will require that the customer's equipment be tested and commissioned by suitably qualified personnel at the time of the initial installation.

Facilities must be provided for the disconnection of all high voltage and protection circuits.

High voltage systems supplying customers classified as contestable under *the Electricity (Third Party Access) Act* shall comply with the *Connection Technical Code*.

Suitable means of earthing sections of the installation must be provided so that equipment can be worked on safely.

Customers who intend to install or add to a high voltage installation should submit

a proposal to the Manager, and await a reply in writing before proceeding with the ordering of equipment.

If the customer purchases or installs any high voltage equipment before the design, construction, and method of installation of the equipment have been formally approved by the Manager, Power and Water may refuse to connect the whole, or any part of, the equipment which in the opinion of the Manager is not satisfactory.

High voltage systems must be operated so as to comply with requirements of the Power System Controller. All work on such systems must be carried out in accordance with the procedures set out in the Electrical Safety Manual (Green Book).

Every high voltage installation must be regularly maintained in good order, so that it will perform the functions for which it was designed. AS/NZS 2650:2000 "Common specifications for high-voltage switchgear and control gear standards" is relevant in this regard.

4.8 Compliance with Wiring Rules and Service and Installation Rules

The Act requires that, except where approved otherwise, before a person carries out electrical wiring work, he shall notify Power and Water on the prescribed form of his intention to do so. It also requires a person who has completed such work to advise Power and Water of the completion on the prescribed form. The first form is entitled "*Notice of Intention to Carry Out Electrical Installation Work*" (NIW) and the second is entitled "*Certificate of Compliance*". NIWs are available from Power and Water's offices, while CoC forms are available from the Electricity Safety Regulator.

NIWs need not be submitted for work not prescribed in the *Installation Rules*. In such cases the installing contractor need not submit a CoC to Power and Water (however, a CoC must still be raised, and a copy given to the customer, as required by the Regulations).

On receipt of a CoC, Power and Water's officer may carry out a safety inspection and a test of a new electrical installation. If the inspection and testing show that the installation is not safe, Power and Water may refuse to give supply to the installation, or any addition or alteration made to it.

As this inspection is made after the installation has been completed, and is therefore, limited in its scope, neither the inspection, nor the connection of the installation shall be deemed as giving assurance of compliance with the Wiring Rules or the Service and Installation Rules.

Furthermore, the inspection and connection shall not be regarded as implying compliance with any Specification, nor in any way as giving an assurance of quality.

4.9 Installation Rules

Installation Rules which outline Power and Water's policies in relation to certain aspects of electrical installations procedures and methods shall be deemed to be incorporated in, and form part of these *Service Rules*.