



AM-STD-0002

Installation Connection Standard

Asset Management – Network Assets

DOCUMENT NO.	AM-STD-0002	VERSION NO.	3.0
DATE	26 Jul 2021		
SECURITY CLASS	Public – Social Media		
REVIEW CATEGORY	3 Years - Very Low Risk	REVIEW DUE	31 Jul 2024

Approvals

CREATED BY:	Full name	Select a date.	SIGNATURE
	Title		
APPROVED BY:	Anton Booyzen	26 Jul 2021	
	GM Asset Management		SIGNATURE

Version History

VERSION	APPROVED BY	DATE
1.0	Chief Engineer	21-MAR-18
2.0	GM Asset Management	28-APR-21
3.0	GM Asset Management	26-JUL-21

Version Change Table

VERSION	PAGE	PARAGRAPH	DESCRIPTION OF CHANGE
2.0	30-32	Various	Reduced contract supply capacity requirement from 100kVA to 75kVA Added requirements around smart meters
3.0			Changing Security to Public – Social Media

Table of Contents

1. Purpose	6
2. Definitions	6
3. Connections General	8
3.1 Contract Supply Capacity	8
3.2 Domestic Connections	10
3.3 Network Connection Point	11
3.4 LV Connections	11
3.5 High Voltage Connection	11
3.6 Multiple Connections	12
3.7 Line Charges	12
3.7.1 General	12
3.7.2 Off Peak Services	12
3.7.3 Domestic Line Charges	13
3.7.4 Multiple Metering Points	13
3.8 Installation/Disconnection	14
4. Ownership Boundaries and Responsibilities	14
4.1 General Conditions	14
4.4.1 Installation	14
4.4.2 Network	14
4.2 Voltage Levels	15
4.3 Low Voltage Installations	15
4.3.1 Standard Single Installation Supply	15
4.3.2 Single Owner with Single Supply, but Multiple Metering Points	16
4.3.3 Multiple ICPs/Installations within a Single Building- Single Network Connection	16
4.3.4 Multiple ICPs/Installations - Private Road	16
4.4 High Voltage Installations	17
4.4.1 General	17
4.4.2 LV Installation with Tee'd Transformer	17
4.4.3 LV Installation with feed-through Substation	17
4.4.4 LV Installation with remote feed-through switchgear and Tee'd Transformer	17
4.4.5 LV Installation with Tee'd Transformer and LV Interconnection	18
4.4.6 HV Installation Connection	18
4.4.7 HV Installation with Dedicated HV feeders	18
4.4.8 HV Installation with Feed-through	18
5. Applications and Approvals	19

5.1	Applications for Network Connection.....	19
5.2	Installation Modifications	19
5.3	Approval to Connect.....	20
5.4	Customer Connection Service Standards.....	20
6.	Costs for a New Network Connection.....	20
6.1	Cost Responsibilities	20
6.2	Enhanced Supply	21
6.3	Temporary Connection.....	21
7.	Installation Loads.....	21
7.1	Power Factor.....	21
7.2	Voltage Fluctuations.....	21
7.3	Motor Starting.....	21
7.3.1.	Exempt Motor Sizes	21
7.3.2.	Non-Exempt Motors	22
7.3.3.	Multiple Motor Installations.....	22
7.4	Harmonic Disturbances	22
7.5	Capacitors.....	22
8.	Mains.....	23
8.1	General Requirements	23
8.2	Installation Livening.....	23
8.3	Aerial Mains	23
8.3.1.	General Conditions for all Aerial Mains.....	23
8.3.2.	Special Conditions for LV Mains.....	24
8.3.3.	Special Conditions for Reconstructed Mains	24
8.4	Underground LV Mains in Underground Reticulated Areas	25
8.4.1	Pillar Boxes	25
8.4.2.	Connection of Mains to Pillar Boxes	25
8.5	LV Underground Mains in an Overhead Area.....	25
8.5.1.	Pole Top Supply.....	25
8.5.2.	Pillar Box Supply	26
9.	Transformers Or Substations On Installation Owners' Premises	26
9.1	General Requirements	26
9.2	Space Requirements.....	27
9.2.1.	Pole Substations	27
9.2.2.	Kiosk Substation	27
9.2.3.	Indoor Substations	27

9.2.4. Outdoor Ground Mounted Substations	27
10. Installation With Generation	27
11. Fault Level Considerations	27
11.1 General	27
11.2 Contribution to Fault Level from within the Installation	28
12. Protection.....	28
12.1 General	28
12.2 Protection of LV Mains Connected to LV Distribution Network	28
12.3 LV Connections from a Substation on an Installation Owner’s Property	29
12.3.1. Transformers up to 300kVA.....	29
12.3.2. Transformers greater than 300kVA without an LV Interconnection	29
12.3.3. LV Supply from a Substation with an LV Interconnection	29
12.4 Protection of HV Connections	29
12.5 Unbalanced Voltage	29
13. Metering	30
13.1 General Metering Requirements.....	30
13.2 Metering Requirements for All Installations.....	30
13.3 Additional Requirements for CT Metering.....	30
13.4 Network Metering and Load Control – EIL and TPCL Networks only	30
13.5 Limits of Whole Current (WC) Metering and CT Metering.....	31

Appendices

Appendix 1 – Capacity Guarantee Agreement	33
Appendix 2 – Installation Connection Application Form.....	35
Appendix 3 – Motor Application Form	37
Appendix 4 – Customer Connection Service Standards	38
Appendix 5 – Aerial Mains Arrangement	39

1. Purpose

This standard defines the requirements for connection to PowerNet's electricity Networks for the purpose of receiving a supply of electricity.

2. Definitions

Unless otherwise defined below, the terms used in this standard have meanings as defined in the Electricity Act 1992 and the Electricity Regulations 1997 and their subsequent amendments.

Any Time Demand - The maximum peak demand, in kVA, of the Installation.

Capacity Guarantee Agreement - Means an Agreement whereby a new Installation Owner agrees to pay for a certain Contract Supply Capacity for a specified period – *Appendix 1*.

Capital Contribution - Means a contribution from a new Installation Owner to cover the excess capital investment in the Network required to supply the Installation over the amount which is recovered through the line charges.

CBD - Central Business District - Means the main commercial area of Invercargill City.

Contract Supply Capacity - Means the maximum load in kVA the connection is designed to deliver.

Certificate of Compliance - Means the certificate issued by the electrician/inspector under Electricity legislation to confirm compliance with that legislation.

Connection Fee - A charge to recover the cost of processing the Installation Connection Application for a new connection.

Domestic Premises - Shall have the meaning defined in Section 90 of the Electricity Industry Reform Act 1998.

EIL - Electricity Invercargill Limited.

EGR - Electricity Governance Rules.

Electricity Regulations - The Electricity Regulations 1997 and subsequent amendments.

Electricity Retailer - Means an electricity retailer who has a valid Electricity Conveyance or Use of System Agreement with Electricity Invercargill Limited, The Power Company Limited, OtagoNet Joint Venture, or Electricity Southland Limited.

HV - High voltage - 1,000 volts or above.

Installation - Means the electrical wiring in a building or similar for the purpose of being connected to the Network to receive a supply of electricity.

Installation Owner - Means the Owner of, or person responsible for, the premises on which the Installation is located or the person responsible for the Installation.

Installation Connection Application Form - An example is shown in Appendix 2.

ICP - Installation Control Point - Means the point at which a consumer is supplied with electricity and at which the supply of electricity may flow between the Local Network and an Installation, where the Installation interconnects with an isolation device owned or controlled by the Distributor.

kVA - Kilovolt-ampere.

kVA Demand Metering - kVA Metering is required by PowerNet to obtain an annual demand and usage profile for line pricing purposes.

Line Charge - Charges imposed by PowerNet for provision of line function services and connection of an Installation to the Network.

Note - Line charges are charged to the consumer's Electricity Retailer. That Electricity Retailer charges the consumer and may reconfigure the charges as they see fit.

LLN - Lakeland Network (An electricity network in the Wakatipu Basin owned by Electricity Southland Limited managed by PowerNet Limited).

Load Factor - Is defined as average load divided by the maximum load and is equal to the total kWh divided by the maximum demand multiplied by the number of hours in the prescribed period.

LV - Low voltage - up to 600 volts.

Mains - The cable or wiring of the Installation connecting between the Point of Supply and the main switchboard and/or Metering Point.

MCB - Main Circuit Breaker - (In the context of this document) A circuit breaker fitted on the switchboard to limit load of the Installation, it must be of an acceptable type and able to be sealed by PowerNet.

Metering Point - Means the location or locations in an Installation where the metering equipment is installed.

MVA – Megavolt ampere.

Network - Means the system for the conveyance of electricity including all fittings comprising that system owned by Electricity Invercargill Limited, The Power Company Limited, OtagoNet Joint Venture or Electricity Southland Limited and managed by PowerNet.

Network Connection Point (NCP) - The point of connection of an Installation or Installations to the Network for the purpose of receiving an electricity supply.

OJV - OtagoNet Joint Venture (previously Otago Power Limited).

Point of Common Coupling - Means the point of common coupling which is defined as the point in the Network, electrically nearest to the Installation at which other Installations are or may be connected.

Point of Supply (POS) - The demarcation point between the Network and the Property/Installation Owner's ownership.

PowerNet - PowerNet Limited.

Property Owner - The owner of a property on which there is an Installation. The Property Owner may not necessarily be the Installation Owner, e.g. rental situations.

Ripple Control System - A facility involving broadcasting an electrical signal through the electricity network that can be received in an Installation by a device for the control of meters and/or electrical circuits, for the purpose of controlling the load on the network.

Ripple Receiver - A device in an Installation that receives the Ripple Control Signal and controls meters and/or electrical circuits.

Specific Ownership Agreement - A formal agreement between the Network owner and a Property/Installation Owner to establish private ownership of a line on private property that would normally be owned by the Network owner.

TOU Metering - TOU Metering measures the energy each half hour used by the whole Installation.

TPCL - The Power Company Limited.

All other definitions as per Electricity Regulations 1997.

3. Connections General

3.1 Contract Supply Capacity

The Contract Supply Capacity is the maximum electrical capacity of the Installation which the PowerNet Network is contracted and in most cases designed to supply. PowerNet will install service fuses at the ICP in accordance with the Contract Supply Capacity shown in the table below. Alternatively, the Contract Supply Capacity for larger installations is the next standard transformer size above the Anytime Demand of the Installation.

CONTRACT SUPPLY CAPACITY (NOMINAL)	MAXIMUM ICP FUSE SIZE PLUS OTHER CAPACITY RESTRICTION IF REQUIRED	
	EIL/TPCL	OJV
DOMESTIC		
Small - 8kVA (Single Phase only)	63 amp ICP Fuse 32 amp MCB on Switchboard	N/A
Standard - Single Phase	63 amp ICP Fuse 80 amp on Special Request	63 amp ICP Fuse 80 amp on Special Request
Special - Multi Phase	2 or 3 x 63 amp ICP Fuses	2 or 3 x 63 amp ICP Fuses
Low User - 10% Fixed Charge	As per Small, Standard or Special	As Standard or Special
NON DOMESTIC SINGLE PHASE		
Streetlight	5 amp Fuse	5 amp Fuse
1kVA (Un-metered)	5 amp ICP Fuse	5 amp ICP Fuse
8kVA	40 amp ICP Fuse	N/A
20kVA	63 amp ICP Fuse 80 amp on Special Request	63 amp ICP Fuse 80 amp on Special Request
50kVA	N/A	200 amp ICP Fuse
NON DOMESTIC TWO PHASE		
30kVA	2 x 63 amp ICP Fuses	2 x 63 amp ICP Fuses

CONTRACT SUPPLY CAPACITY (NOMINAL)	MAXIMUM ICP FUSE SIZE PLUS OTHER CAPACITY RESTRICTION IF REQUIRED	
	EIL/TPCL	OJV
50kVA	N/A	2 x 100 amp ICP Fuses
NON DOMESTIC THREE PHASE		
15kVA	3 x 20 amp ICP Fuses	3 x 20 amp ICP Fuses
30kVA	3 x 40 amp ICP Fuses	3 x 40 amp ICP Fuses
50kVA	3 x 80 amp ICP Fuses	3 x 80 amp ICP Fuses
75kVA	3 x 100 amp ICP Fuse	3 x 100 amp ICP Fuse
100kVA	3 x 160 amp ICP Fuse	3 x 160 amp ICP Fuse

CONTRACT SUPPLY CAPACITY (NOMINAL)	MAXIMUM ICP FUSE SIZE PLUS OTHER CAPACITY RESTRICTION IF REQUIRED
	LLN
DOMESTIC	
Small – 8kVA - Single Phase	63 amp ICP Fuse 32 amp MCB on Switchboard
15kVA - Single Phase	63 amp ICP Fuse
15kVA - Multi Phase	63 amp ICP Fuses 20 amp MCB on Switchboard
NON DOMESTIC SINGLE PHASE	
Streetlight	5 amp Fuse
1kVA (Un-metered)	63 amp ICP Fuse 5 amp MCB on Switchboard
Builders Temporary Supply (2kVA Un-metered)	63 amp ICP Fuse 20 amp MCB on Switchboard
8kVA	63 amp ICP Fuse 32 amp MCB on Switchboard
15kVA	63 amp ICP Fuse
23kVA	100 amp ICP Fuse
NON DOMESTIC THREE PHASE	
15kVA	63 amp ICP Fuses 20 amp MCB on Switchboard
24kVA	63 amp ICP Fuses 32 amp MCB on Switchboard
41kVA	63 amp ICP Fuses

CONTRACT SUPPLY CAPACITY (NOMINAL)	MAXIMUM ICP FUSE SIZE PLUS OTHER CAPACITY RESTRICTION IF REQUIRED
	LLN
69kVA	100 amp ICP Fuses
103kVA	160 ICP Fuses
138kVA	200 ICP Fuses
172kVA	250 amp ICP Fuses
207kVA	300 amp ICP Fuses
276kVA	400 amp ICP Fuses

It is important to choose the correct Contract Supply Capacity. Proposed loads and any potential future increase should be determined and considered along with the practical levels (allowing for diversity) that the entire Installation will operate at. It is recommended, discussions take place with PowerNet staff.

Contract Supply Capacities up to 100 kVA are levied in standard steps as show in the previous table. Capacities over 100 kVA relate to standard distribution transformer sizes, i.e. 100, 200, 300 500, 750, 1000 kVA.

The Installation Owner must request a specific Contract Supply Capacity for all new Installations. The level of supply to be delivered will be controlled by the size of the ICP Fuse or an MCB on the switchboards. The MCB must be a type acceptable to PowerNet and must be able to be sealed to prevent tampering. The Contract Supply Capacity will be confirmed in a letter to the Installation Owner once the application has been approved and the Line Charge will reflect it.

The size of the transformer will not determine the Contract Supply Capacity as it is solely at the discretion of PowerNet.

For all Installations including those with multiple metered locations the service (ICP) fuse will control the total Installation.

3.2 Domestic Connections

The PowerNet standard supply for Domestic Premises is single phase.

Only purely Domestic Premises may be supplied under Domestic Supply Capacity, e.g. house, garage, storage shed. Sub-mains to buildings for other uses are not permitted.

For Domestic Installations the lowest Contract Supply Capacity is monitored by PowerNet specified sealed 32 amp circuit breaker installed on the main switchboard or outdoor metering board controlling the whole Installation and is therefore single phase Installations only. For special conditions relating to the Installation of the circuit breaker see Appendix 7.

If a Domestic Premises' Installation Owner requires a three phase supply and PowerNet considers that some or all of the load is outside of the definition of a domestic item (e.g. a motor), the premises will require a non-domestic three phase Contract Supply Capacity.

If truly domestic load requirements, e.g. large heating load, require a multi-phase supply the Special Domestic Contract Capacity is available.

Lower User – 10% Fixed Charge Option – is available for a normal place of residence. It is not available for holiday homes.

3.3 Network Connection Point

PowerNet shall generally supply through only one Network Connection Point to each Installation and this will be protected at the ICP by one set of service fuses or equivalent protection device and/or MCB appropriate for the Contract Supply Capacity.

3.4 LV Connections

LV Connections can be made by connection of a LV Mains to the LV Network or by connection to the LV side of a transformer located on the Installation Owner's property. The requirement for a transformer is dependent upon the Contract Supply Capacity, the available capacity, present loading on the existing LV Network in the vicinity and the distance from the property boundary to the Installation Owner's main switchboard. Each connection application will be considered individually and the most appropriate connection method determined by PowerNet.

In urban areas capacities up to three phase 100 amps are usually available from the local LV Network. Connection capacities between 100 and 400 amps may require the installation of a transformer on the Installation Owner's property.

In many rural areas, the configuration of the HV Network means that only single phase supplies are available. In these areas the largest standard capacity connection available without upgrading the HV Network to three phase is TPCL 30 kVA/OJV 50 kVA single phase, or 230-0-230V two phase.

Where the main switchboard is a significant distance from the road reserve PowerNet will usually install a transformer close to the main switchboard to reduce the length of the LV Mains. In this case Installation Owners will be responsible for the initial cost of the HV line on their property. Where the Installation/Property Owner chooses to own their own HV line a Specific Ownership Agreement will be required. In all other cases ownership and responsibility for routine, normal maintenance will be the responsibility of PowerNet.

3.5 High Voltage Connection

Installations can be supplied and metered at 11kV but it is generally only economic for capacities in excess of 1MVA or when there is special need for HV supply.

Supply will be via an incoming isolation device such as a circuit breaker, isolator, or fuse switch. HV current transformers and voltage transformers will be required for metering purposes. The instrument transformers may be supplied and maintained by PowerNet or its agent but suitable accommodation shall be provided by the Installation Owner for this equipment in accordance with the EGR or other industry standards. HV Installation Owners shall ensure the Installations comply with the current Electricity Regulations.

When supply is required from paralleled HV feeders to meet loading or supply security requirements, special protection facilities will be required.

Where the Installation/Property Owners choose to own their own HV Installation a Specific Ownership Agreement will be required.

3.6 Multiple Connections

If the Installation Owner has more than one Network Connection Point associated with the same premises, the Installation Owner shall not parallel the supplies or provide any facilities to parallel the supplies. This is to avoid the possibility of back feeds creating hazardous situations on the PowerNet Network.

The Installation Owner is also required to provide all physical separations as required in the Electricity or Building Regulations, e.g. fire walls between adjoining areas.

3.7 Line Charges

3.7.1 General

- (a) Line Charges reflect the cost of providing the Network capacity required to supply the Contract Supply Capacity of an Installation. Line charges are based on the annual revenue required and hence the Contract Supply Capacity shall not be reduced for a minimum period of 12 months.
- (b) For EIL and TPCL the fixed (daily) component of the Line Charge is classified as either Peak or Off-Peak depending on the usage pattern.

Off Peak has a lower fixed charge than Peak. An Installation qualifies for an Off-Peak supply charge if (At least 25% of the total energy consumption):

- Is on a separately metered load controlled rate; or
- Is on the Night Register of Day/Night Two Rate Metering.

3.7.2 Off Peak Services

PowerNet has a Ripple Control System which is used to switch appliances within Installations. In general it is operated to reduce the loading on the Network, and/or (subject to Network constraints) to switch at pre-set times in accordance with the Electricity Retailers' requirements.

All ripple controlled appliances must be fixed wired and have the following characteristics:

- be space heaters capable of storing adequate heat for a period of at least three hours.
- be water heaters with sufficient storage capacity for a period of at least eight hours per day
- be an appliance which cannot be substituted by a similar electrical appliance when the supply is interrupted.

The following are also allowed on controlled rates:

- fixed wired heated towel rails
- fixed wired oil filled radiators in bedrooms
- a two element water heater where the bottom element must only be energised between 11.00 pm and 7.00 am (Night Rate) and the top element must be connected to the 24 hour available energy rate.

3.7.3 Domestic Line Charges

Line Charges for Domestic Contract Supply Capacities are in three categories:

- **Small** - Single Phase (with 32A MCB)
- **Standard** - Single Phase Supply.
- **Special** - Multi Phase Supply (see clause 3.1).

Currently PowerNet's fixed charges for this capacity are the same as for Standard Domestic, however this does not preclude the application an appropriate higher charge in the future.

- **10% Fixed Charge**

Capacity as per Standard or Special but lower fixed charge and higher variable charges, in line with legislative requirements.

3.7.4 Multiple Metering Points

For Installation Owners with multiple metered Metering Points (see Dwg 4.3.2), a single supply charge is applied based on the overall Contract Supply Capacity. The following conditions apply:

- 3.7.4.1 All Metering Points must have a single Network Connection Point and must have an overall Contract Supply Capacity of no less than 15 kVA single phase or 30 kVA three phase.
- 3.7.4.2 The fuses at the ICP or low voltage side of the transformer (if applicable) will be sized according to the Contract Supply Capacity. Thus all Metering Points must be capable of operating together within that capacity.
- 3.7.4.3 Historically Mains have been allowed to extend up to three spans along the road on PowerNet poles. The line must be exclusively used by the Installation Owner and the latter will be responsible for the capital and renewal costs of the Mains along the road.

No new multiple Metering Points will be allowed using lines on PowerNet poles.

- 3.7.4.4 Line Charges are based upon the actual fusing arrangement at the ICP and/or MCB mounted on the Switchboard in accordance with the nondomestic premises schedule.
- 3.7.4.5 Installation Owners may choose to provide downstream fuses for each Metering Point if they wish to or alternatively downstream fuses may be required to comply with the Regulations, such as due to cable current rating. These fuses will be at the Installation Owner's cost. The MCB could also be used for this purpose as well as determining the Line Charges.
- 3.7.4.6 It will not be possible for an Installation Owner with multiple Metering Points to have one of the Metering Points disconnected unless the Installation Owner is prepared to have the meters removed and the supply line or cable physically disconnected from the supply at the ICP. Unless the service fuses at the ICP are then downsized, or if appropriate an MCB fitted, the Line Charge will remain the same.

3.8 Installation/Disconnection

If an Installation is disconnected, PowerNet reserves the right to remove all of its equipment including meters and transformers after reasonable endeavours to notify the last known Property Owner in writing.

If the Property Owner wishes to retain PowerNet equipment for possible future use, they will be responsible for paying annual charges reflecting a return on the capital value of the equipment. The equipment will be disconnected from the Network and any remedial work prior to reconnection will also be at the Property/Installation Owner's expense.

4. Ownership Boundaries and Responsibilities

4.1 General Conditions

In order to define maintenance responsibilities and allocate capital costs it is necessary to define the boundaries between fittings that are part of the Network and fittings that are part of the Installation.

A property boundary is defined as the legal boundary of the property occupied or owned by the Installation Owner. In a situation where the connection to an Installation is via cables in a right of way held in common with other Property Owners, the right of way is deemed to be part of the Installation Owner's property.

All fittings on a property that are part of the Network will be maintained by PowerNet. Property Owners shall provide access to PowerNet or its agent to carry out this maintenance, testing and inspection and also provide reasonable mechanical protection to prevent damage to the equipment.

Maintenance of fittings that are part of the Installation is the responsibility of the Installation Owner.

4.4.1 Installation

The following are deemed part of the Installation, and the Installation Owner's responsibility where they are within the property boundary relating to the Installation:

- All LV lines and/or cables exclusively used by the Installation Owner.
- HV lines and/or cables where there is a Specific Ownership Agreement for private ownership.

4.4.2 Network

The following fittings, where located on private property, are deemed Network unless there is a Specific Ownership Agreement to the contrary:

- Fittings used to convey electricity to other properties.
- ICP Fuses.
- High voltage substation equipment and/or transformer and associated earthing (see 4.4).
- Incoming HV switchgear when there is a HV supply.
- HV lines and/or cables.

4.2 Voltage Levels

PowerNet will maintain the voltage at the Point of Supply to within the statutory limits as prescribed in the Electricity Regulations.

Voltages and current will be measured as close as practical to the Point of Supply as follows:

- (a) For LV connections the point where the Mains crosses the boundary, e.g. pillar box.
- (b) For Installations with multiple Metering Points the single Point of Supply or ICP for all Metering Points.
- (c) For supply from a transformer on the Installation Owner's premises, the LV terminals of the transformer.

The apportioning of costs for rectifying voltages outside the limits depends on the cause of the problem.

If the voltage at the Point of Supply is outside the legal limits, PowerNet will be responsible for the solution to the level of the Contract Supply Capacity.

If the voltage at the Point of Supply is within the legal limits, the Installation Owners will be responsible if there is a problem on their premises.

PowerNet is not liable for any damage resulting from momentary fluctuations in the voltage.

In general PowerNet requires that the voltage drop between the Point of Supply and the meters does not exceed 2.5%. This limit is extended to 4% in some cases as shown in the following clauses. These requirements are consistent with requirements of the Electricity Regulations.

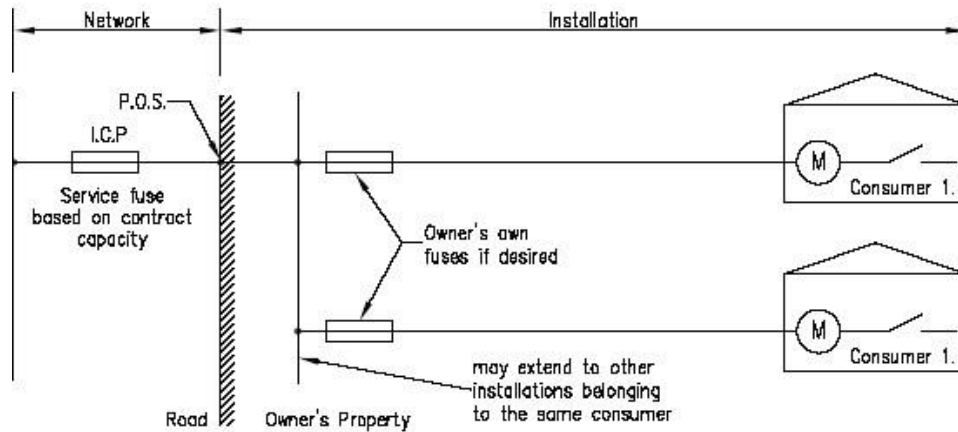
4.3 Low Voltage Installations

The Installation Owner is responsible for all costs associated with the Installation including the construction, maintenance and renewal.

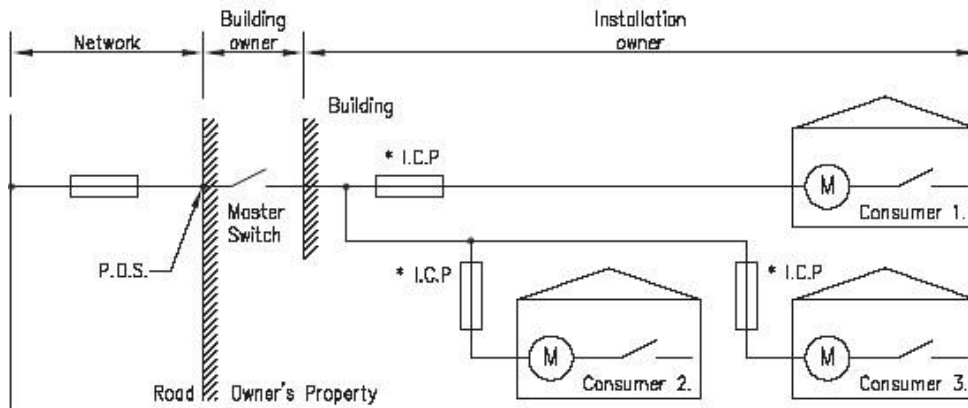
4.3.1 Standard Single Installation Supply



4.3.2 Single Owner with Single Supply, but Multiple Metering Points

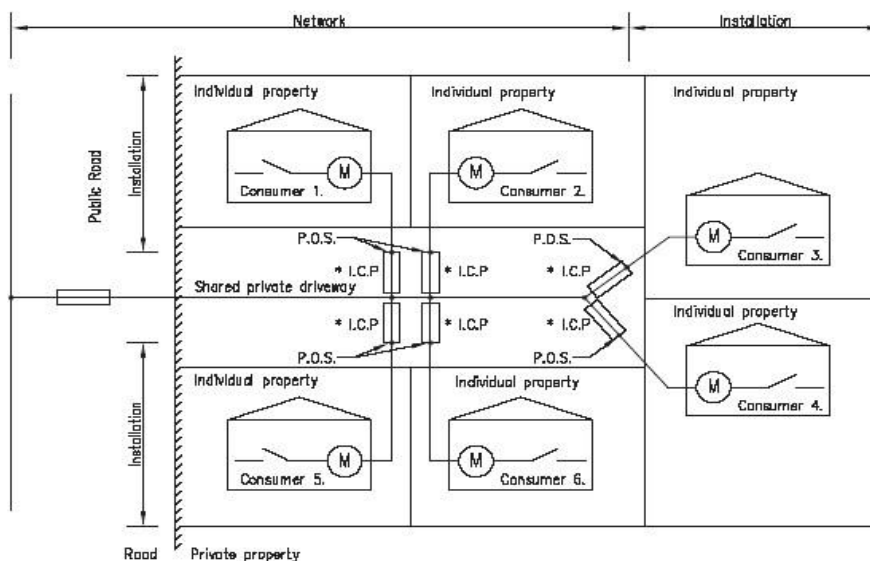


4.3.3 Multiple ICPs/Installations within a Single Building- Single Network Connection



For multiple Installations, PowerNet permits a voltage drop up to 4% between the Point of Supply and the Metering Point.

4.3.4 Multiple ICPs/Installations - Private Road



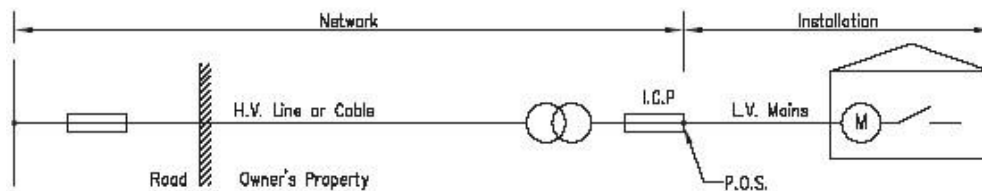
- For 4.3.3 and 4.3.4 these fuses are provided by PowerNet and must be installed in such a manner that access is available to PowerNet authorised staff at all times. This is the ICP for the Installation.

4.4 High Voltage Installations

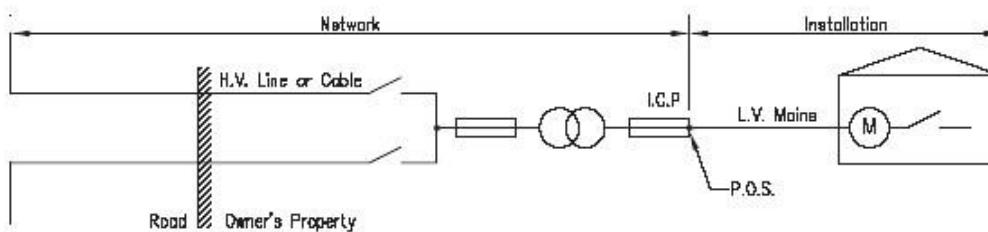
4.4.1 General

- (a) The Installation Owner or Property Owner may be required to provide foundations for some ground-mounted equipment.
- (b) In all cases, PowerNet permits a voltage drop of up to 4% between the Point of Supply and the Metering Point.

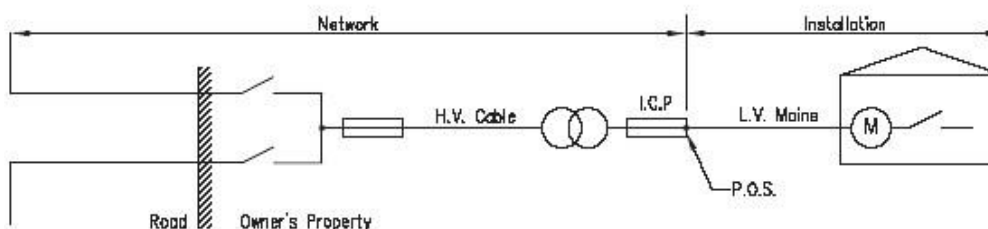
4.4.2 LV Installation with Tee'd Transformer



4.4.3 LV Installation with feed-through Substation

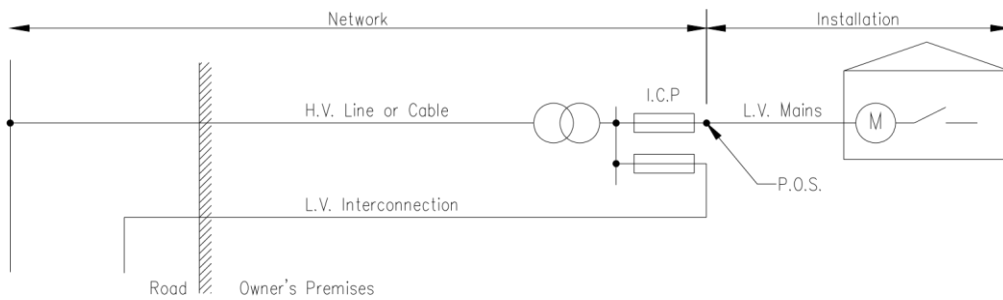


4.4.4 LV Installation with remote feed-through switchgear and Tee'd Transformer



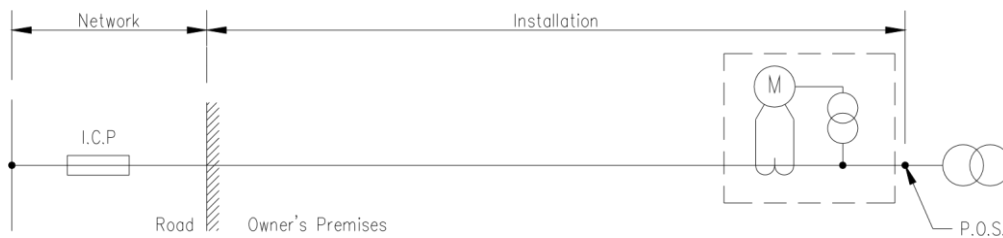
In cases 4.4.2, 4.4.3 and 4.4.4 there may be no LV fuse, as described in clause 12.3.2. In these cases, the HV fuse will be classed as the ICP fuse.

4.4.5 LV Installation with Tee'd Transformer and LV Interconnection



In cases 4.4.3, 4.4.4 and 4.4.5 PowerNet will require a legal easement to secure the Network components on the Property Owner's property.

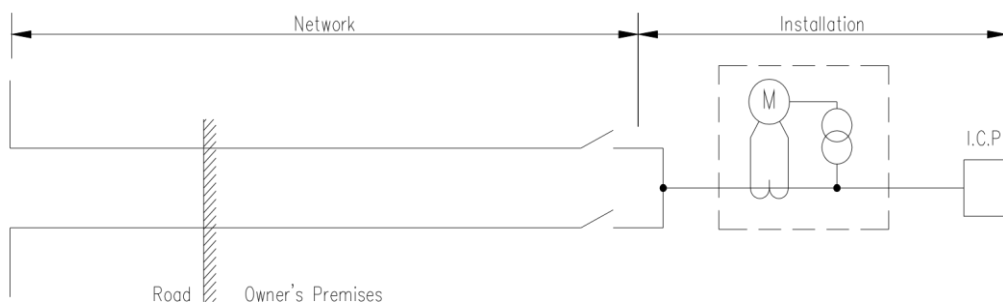
4.4.6 HV Installation Connection



4.4.7 HV Installation with Dedicated HV feeders



4.4.8 HV Installation with Feed-through



For Dwg's 4.4.6, 4.4.7 and 4.4.8 a Specific Ownership Agreement will be established with the Installation Owner to confirm the point of demarcation in responsibility.

5. Applications and Approvals

5.1 Applications for Network Connection

Applications for a connection to the Network shall be made on the PowerNet “Installation Connection Application” form. These forms are available at PowerNet’s office.

All details of Section 1 of the form must be completed and site/location plan provided to obtain approval for connection of an Installation to the Network.

5.2 Installation Modifications

Existing Installation Owners shall complete a PowerNet “Installation Connection Application” and obtain approval before proceeding with any of the following work.

- (a) For domestic Installations, connection of appliances with a combined load in excess of 5kW.
- (b) Connection of motors
 - For all Installations with Contract Supply Capacity up to 30kVA, installation of electric motors greater than 1.5kW.
 - For Installations with Contract Supply Capacity over 30kVA, installation of electric motors greater than 5% of the Contract Supply Capacity.
 - Details of motors are to be provided on the Motor Installation Form shown in Appendix 3. This form must be accompanied by an Installation Connection Application form showing the Contract Supply Capacity required, (either confirming the existing capacity or requesting a change).
- (c) Connection of Power Factor correction equipment.
- (d) Installing an appliance that may affect the quality of supply to other Installations by the introduction of harmonics or by causing voltage fluctuations, e.g. welders, etc.
- (e) Replacing, reconfiguring or altering all or part of the Mains between the Installation Owner’s boundary and the Metering Point.
- (f) Installation of capacitors that result in the total capacitive load of an Installation exceeding 2% of the Contract Supply Capacity.
- (g) Requesting a change in the Contract Supply Capacity.
- (h) Installing any generation equipment.
- (i) Relocation of the meter board.

Note: Where a builders temporary is set up on the end of a new permanent Mains cable, in what will become its final location once the new building is completed, fitting the board to the building is not considered relocation and no application is required. However, the electrician is responsible for having the metering recertified if seals are broken to connect the new internal circuits.

- (j) Adding a new separately metered building under an existing supply point (ICP).
- (k) Reconfiguring supplies for Installations previously on separate supply points (ICPs) to be fed from a single ICP.

5.3 Approval to Connect

The following conditions shall be met before a connection will be permitted:

- (a) The Installation Owner has entered into an agreement to take supply of electricity from an Electricity Retailer.
- (b) The Installation (including any Mains) has a certified Electrical Certificate of Compliance issued in accordance with the Electricity Regulations.
- (c) The Installation Owner has agreed to pay the Connection Fee, Capital Contribution if applicable and any other costs required to provide a supply. If applicable, the Capacity Guarantee Agreement must also be signed off.
- (d) The metering has been installed by a person authorised under the EGR.

5.4 Customer Connection Service Standards

Appendix 4 details the current service standards provided by PowerNet.

6. Costs for a New Network Connection

6.1 Cost Responsibilities

- (a) All costs including construction associated with the Installation are the responsibility of the Installation Owner. The demarcation points between the Installation fittings and Network fittings are defined in clause 4.
- (b) In order to establish a Network Connection Point, PowerNet may need to carry out additions or alterations to its network. Installation Owners may be required to enter into a Capacity Guarantee Agreement and/or make a Capital Contribution towards the cost of this work in accordance with the current PowerNet capital investment conditions.
- (c) All new connections will incur a Connection Fee payable by the Installation Owner when the supply is connected. This fee covers the costs of administration for processing the application, including raising the ICP and notifying and/or liaising with the Electricity Retailer.
- (d) If the supply is initially taken as a temporary arrangement (builders' temporary supply) the costs of converting it to the final permanent arrangement will be the responsibility of the Installation Owner.
- (e) When there is a choice of connection method the method resulting in the overall lowest Network capital investment for PowerNet shall be used subject to (a) and (b) above.
- (f) If an Installation Owner requires a connection method other than the one resulting in the lowest cost to PowerNet, the Installation Owner shall make an additional Capital Contribution equal to the difference in cost between the selected method and the lowest cost method.

6.2 Enhanced Supply

When an Installation Owner requires a supply with enhanced electrical characteristics or enhanced reliability beyond that which would normally be provided, then the Installation Owner shall meet the additional costs incurred by PowerNet in providing facilities to satisfy those requirements.

6.3 Temporary Connection

Where a supply is required for a short period of time and then will be removed completely, all costs associated with the provision and removal of a temporary connection shall be met by the Installation Owner.

7. Installation Loads

7.1 Power Factor

The Power Factor of an Installation measured at the Metering Point shall not be less than 0.95 lagging. All Installations with a Contract Supply Capacity 100kVA and above shall be metered using kVA Demand Metering.

In general, to ensure compliance all motors rated above 2.0kW should have power factor correction capacitors installed. See clause 7.5 for conditions relating to installation of capacitors.

7.2 Voltage Fluctuations

Electric appliances which are part of one Installation shall not cause voltage fluctuations at the point of common coupling with other Installations in excess of the threshold of irritability as determined in the appropriate New Zealand Standards or other legislation in force at the time.

7.3 Motor Starting

The motor starting limitations of this standard are those recommended in the NZ Electrical Supply Engineers Association report on Motor Starting Currents for AC motors and in all cases must comply with clause 7.2.

Running motors with fluctuating loads shall also comply with clause 7.2 (available from the Electricity Engineers Association).

7.3.1. Exempt Motor Sizes

AC motors up to the sizes shown below are normally not subject to starting current limits and may be started direct on line.

Residential areas	Single phase	1.5kW	
	Single phase	2.0kW	In commercial and industrial areas
	Three phase	4.0kW	In residential areas
Commercial and industrial areas	Three phase	7.5kW	

7.3.2. Non-Exempt Motors

All motors larger than shown in clause 7.3.1 shall be approved by PowerNet prior to connection. The criteria used for approval is that the relative voltage changes on motor start-up shall not exceed the values shown below:

Frequency of Starting	Maximum Relative Voltage Change	
	At PCC	At Zone Substation 11kV or 6.6kV Bus
In excess of 10 starts per hour	1%	0.5%
In excess of 3 starts per day but not more than 10 starts per hour	3%	1.0%
Not more than 3 starts per day including not more than 1 start between the hours of 5 pm and 11 pm on any day	6%	1.5%
Emergency equipment started infrequently (e.g. fire pumps)	12%	2.0%

7.3.3. Multiple Motor Installations

If several motors on an Installation start automatically when supply is restored after an interruption, then unless delayed or sequenced starting is installed to the satisfaction of PowerNet, the relative voltage change will be assessed on the basis of all motors on automatic control starting simultaneously.

7.4 Harmonic Disturbances

Harmonic voltages and currents introduced into the Network by appliances in an Installation shall not exceed the levels specified in NZECP36.

PowerNet operates ripple control systems with frequencies of 217 Hz (EIL and TPCL) and 317 Hz and 492 Hz (OJV). In addition to the requirements of NZECP36 appliances shall not cause voltages at the above frequencies in excess of 0.7% of the main voltage at the point of common coupling.

7.5 Capacitors

Installation Owners are permitted to install unfiltered capacitor kVAr capacity up to 2% of connection kVA capacity.

Note:

For three phase connections the maximum kVAr per phase is 1/3 the total kVAr allowed. For capacitor loads exceeding the limit above, specific permission to connect shall be obtained from PowerNet which will determine if blocking filters are required. The Installation Owner is responsible for the provision and correct operation of the filters.

Installation Owners installing fluorescent lighting loads are advised to use fittings with lead-lag ballasts which will provide power factor correction without the risk of ripple signal absorption. Electronic fluorescent lighting ballasts do not require capacitors for power factor correction, hence they will not absorb ripple control signals.

8. Mains

8.1 General Requirements

All Mains shall be rated and installed in accordance with Electricity Regulations and PowerNet will require an inspection by a Registered Inspector and Certificate of Compliance prior to livening.

8.2 Installation Livening

Mains can be installed by any person competent and qualified as defined by the Electricity Regulations.

New or replacement Mains shall only be connected to the ICP (service) fuse by a person authorised by PowerNet.

Fusing will be in accordance with clause 3.1.

No connection to the Network will be livened without the documented approval of PowerNet through the PowerNet “Installation Connection Application” form with all sections completed. There are also strict PowerNet authorisation procedures for connecting Installations to the Network.

Note: Evidence of appropriate Power Factor correction equipment will be required if applicable.

8.3 Aerial Mains

All newly constructed or altered lines or line segments must conform to the requirements of this clause, and also those shown in Appendix 5, before connection to the Network will be allowed.

8.3.1. General Conditions for all Aerial Mains

- (a) For new or altered connections the Installation Owner is required to provide dimensions of the location of any pole to carry PowerNet equipment (e.g. transformer, HV fuses, LV service fuses, etc.) to an accuracy of +/- 5m measured from a property boundary or existing PowerNet pole.

These details must be shown on the sketch accompanying the application. This position will be recorded in the PowerNet Network mapping system. For identification purposes a PowerNet pole number will be allocated and a label must be fixed to the pole.
- (b) The line must be self-supporting, i.e. full conductor tension cannot be taken on the Network pole. The total maximum take-off force perpendicular to the Network line allowed on the Network pole is 1000 Newtons. The maximum length of the first span from the Network pole is 60m.
- (c) If the line is no more than three spans, each span is less than 60 metres and the maximum total take off force on the pole does not exceed 1000 Newtons it may not be necessary to install a stay and “slack span” at the take-off end.
- (d) Strain poles shall not be pre-stressed concrete, or ‘light’ construction mass reinforced pole.
- (e) Good engineering practice must be followed. E.g. not using stay eye-bolts to secure other equipment such as stay straps or crossarms, and fitting pole caps to wooden poles.

- (f) Must comply with Electricity Regulations with respect to electrical safety, i.e. pole strength, conductor clearances, sound connections and free from vegetation hazards.
- (g) Termination and angle poles must be adequately stayed with stay wires protected by cattle guards in vulnerable positions, such as open paddocks.
- (h) Special consideration should be given to pole positions so they are not exposed to being hit by vehicles or plant.

8.3.2. Special Conditions for LV Mains

- (a) Aluminium conductor may only be used with approved bimetallic connectors at each termination or joint using different metals.
- (b) Aerial LV Mains shall generally be copper conductor with a minimum size of 16mm² or aluminium conductor with a minimum size of 25mm². The Installation Owner is responsible for providing conductor supports and terminations on his premises. The Mains shall be installed in accordance with ECP28 and ECP34 and satisfy the requirements of the Electricity Regulations.
- (c) It is recommended where possible, neutral screened cable or aerial bundled cable be used for aerial LV Mains due to the enhanced safety this provides.

8.3.3. Special Conditions for Reconstructed Mains

When the respective portion of the line is being worked on, as described below, the Installation Owner must bring that portion of the line up to the appropriate requirements of this standard as follows:

- (a) First span to be 'slack span'
 - (i) On replacement or relocation of the first pole from the Network connection pole.
 - (ii) When rewiring with a larger size of wire than the original line.
 - (iii) When upgrading the line by the addition of extra wires, e.g. conversion from single to three phase.
 - (iv) During any other work that would increase the mechanical loading on the Network pole the line is connected to, e.g. restraining the wire.

At any other time PowerNet may request that a slack span be installed in conjunction with an Installation Owner's own work on a line. In this case PowerNet may pay (only) the incremental cost for the slack span. Decisions on the application of this will be made on a case by case basis.

- (b) Strain pole type
 - (i) When replacing a strain pole.
 - (ii) When relocating a strain pole to a position that would make it vulnerable to being hit by a vehicle or farm machinery, e.g. into an open paddock.
- (c) General engineering and construction methods, e.g. lock nuts and eye bolts
 - (i) On replacement or rebuilding of each individual pole.

8.4 Underground LV Mains in Underground Reticulated Areas

LV Mains in areas with underground LV reticulation will be connected to the Network via an LV pillar box of appropriate size located on the property boundary.

8.4.1 Pillar Boxes

Pillar boxes are special purpose junction boxes that accommodate LV service fuses and provide facilities for connection to the LV underground distribution cables.

Pillar boxes are normally located on the street side of the Installation Owner's property boundary. In residential areas, pillar boxes are generally placed on the street frontage at the junction of two property boundaries allowing the box to serve the two properties.

8.4.2. Connection of Mains to Pillar Boxes

The connection of LV Mains into pillar boxes will be PowerNet's responsibility. Installation Owners shall ensure the Mains cable is installed to the pillar box position with sufficient length to facilitate termination. Copper and aluminium cables can be used for underground Mains, but aluminium cables will require to be terminated with copper tails via AL/CU transition joints for connection into fuse bases. The copper/aluminium transition joint is the responsibility of the Installation Owner. The maximum cable size for a 60 amp fuse base is 35mm² copper and for a 100 amp fuse base is 50mm² copper. If the Mains exceed these sizes reduced size tails are required to be fitted by the contractor.

For larger commercial and industrial Installations, PowerNet will discuss terminations on an individual basis.

8.5 LV Underground Mains in an Overhead Area

8.5.1. Pole Top Supply

In areas where the existing LV Network is overhead Installation Owners can make connection via an underground cable running direct from pole top to meter box or main switchboard by having the Mains buried to the base of a nearby pole, attached to the pole and terminated on to a pole top fuse subject to the following conditions:

- (a) The service cable shall preferably have a copper neutral screen with stranded copper or aluminium conductors.

For connections up to 60 amps the conductors to be terminated in the PowerNet service fuse must be stranded copper and no greater than 35mm².

For connection capacities greater than 60 amps and up to 400 amps the conductors to be terminated must be stranded copper and be no larger than 185mm².

- (b) The cable in the road reserve will be installed by PowerNet. For new connections the cost of this is included with any other costs for the supply in the calculation of possible charges. For alterations to existing supply, e.g. conversion from aerial to underground cable, these costs will be the Installation Owner's responsibility.
- (c) The cable shall cross the Installation Owner's property boundary at a location determined by PowerNet that results in the minimum trenching in the road reserve.
- (d) The Installation Owner shall provide adequate cable to enable connection at the top of the pole.

8.5.2. Pillar Box Supply

In some special circumstances as will be determined by PowerNet, a pillar box will be installed on the boundary. In this case PowerNet will install the connection from the pole top to the box. The connection of the Installation Owner's Mains into the pillar box will be as per clause 8.4.

9. Transformers Or Substations On Installation Owners' Premises

9.1 General Requirements

The maximum single transformer capacity available is generally three phase 1000 kVA. Installations requiring capacities in excess of 1000 kVA will normally require more than one transformer. The size of transformer installed will be at the discretion of PowerNet.

When an Installation is supplied by more than one transformer, the LV connections from the transformers shall not be paralleled unless inter-tripping facilities between the HV and LV Circuit Breakers are installed to prevent back-feed from the LV bus to the HV transformer winding.

When it is necessary to install a substation on an Installation Owner's premises, the Owner shall make available on his premises suitable space to accommodate the transformer, HV cable or lines and associated switchgear.

HV circuits across the Installation Owner's property can be either underground cable or overhead line. A site plan showing the proposed substation location and route for lines or cables is required.

The Installation Owner shall grant an easement in PowerNet's favour for fittings that are associated with the conveyance of electricity if the substation is to also supply other Installations and PowerNet will arrange and meet the surveying and legal costs associated with obtaining the easement. The easements will give PowerNet access rights to equipment associated with the supply of electricity to other Installations for operational and maintenance purposes.

The connection configuration appropriate for each Installation will be decided by PowerNet in consultation with the Installation Owner. The following factors are considered when choosing the most appropriate connection method:

- (a) Location of HV distribution lines and cables.
- (b) Location of main switchboard.
- (c) Access to substation (24 hour access required).
- (d) Supply security requirements.
- (e) Contract Supply Capacity.
- (f) Requirement for LV interconnection for back-up or supply to other Installations.
- (g) Cost
- (h) Provision of adequate protection to prevent accidental contact with live terminals including high voltage secondary protection.

9.2 Space Requirements

The space requirements for a substation on an Installation Owner's property will depend upon the substation type. In all cases allowance should be made for earth conductors and rods.

9.2.1. Pole Substations

For capacities up to 100kVA the transformer and associated fuses may be accommodated on a single pole. For capacities greater than 100kVA and up to 500kVA a two pole structure is required although in most instances PowerNet's policy is to use a ground mounted substation.

The siting of the substation will depend on the location of buildings and the routing of HV lines. Electrical clearances defined in NZECP34 shall be maintained.

9.2.2. Kiosk Substation

A kiosk substation is an outdoor substation with switchgear and transformer accommodated on a concrete base and contained within an integral weather-proof enclosure. These substations can accommodate a single transformer with a capacity up to 1000kVA.

9.2.3. Indoor Substations

Indoor substations are used when the Installation Owner is unable to provide a suitable outdoor site or for technical or economic reasons. The entire substation can be inside or just the HV and LV switchgear. The provision of the space for the substation shall be in accordance with NZS6108 "Accommodation for Electrical Supply Substations in Customers Buildings".

9.2.4. Outdoor Ground Mounted Substations

These substations consist of a pad-mounted transformer and in many cases ground mounted switchgear will be required. This switchgear may be remote from the transformer. Both the transformer and switchgear can be provided with a weather-proof cover or be non-enclosed.

10. Installation With Generation

Where an Installation includes generating equipment for emergency power supply purposes, suitable interlocks shall be provided to prevent the generator being connected to the Network.

An Installation Owner wishing to install generation intended to operate in parallel with the Network should consult with PowerNet to ascertain the requirements applicable to the Installation. The requirements will generally be in accordance with the "Electricity Supply Engineers Association Guide for the Connection of Generating Plant May 1992".

11. Fault Level Considerations

11.1 General

The short circuit rating of Installation equipment at the Point of Supply should be not less than the design fault level of the Network to which it is connected. The choice of equipment for LV connection may take into account attenuation in the Mains.

The PowerNet 11kV Network is designed for a maximum short circuit level of 250MVA, i.e. 13kA at 11kV. 11kV Installations should be designed for a 250MVA prospective short circuit level.

For Installations supplied from the LV Network in residential areas, the prospective short circuit level at the main switchboard will typically be less than 6000 amps.

For Installations supplied from a dedicated transformer, the maximum prospective short circuit levels at the LV terminals of the transformer are as shown below.

Transformer Size (kVA)	Maximum Prospective Short Circuit Current (amps)
Up to 50	2,000
Up to 100	4,000
Up to 200	6,500
Up to 300	9,500
Up to 500	15,000
Up to 750	22,000
Up to 1,000	28,000

Note: If an Installation requires a single LV busbar supply greater than 1,000 kVA, then parallel transformers will be required which will increase the maximum prospective short circuit current.

11.2 Contribution to Fault Level from within the Installation

In the design of the Network, PowerNet may need to take into account the contribution to fault level by the Installation equipment such as large motor loads.

In order to permit these assessments to be carried out, information should be exchanged on prospective fault-power in-feed at the Network Connection Point.

12. Protection

12.1 General

The Electricity Regulations require that every person supplying line function services shall provide a service protective device of appropriate rating to provide protection against short circuits or earth faults on Mains and also prevent such Mains faults from affecting the supply to other consumers.

NZEC28 (2.1.3) requires that the maximum current in a cable must not exceed the current rating of the conductor.

12.2 Protection of LV Mains Connected to LV Distribution Network

Mains connected to the LV distribution system will be protected by HRC fuses in boundary pillar boxes or by pole mounted fuses. These service fuses will provide short circuit protection for the Mains and main switchboard. Installation Owners shall ensure the current rating of their Mains and main switchboard is greater or equal to the service fuse rating or adequate overload protection is provided.

In the case of some premises within the Invercargill CBD the Mains up to the switchboard will have fault protection provided by the distribution cable fuse (up to 400 amp) and overload protection will be provided by the Installation Owner's main switch. PowerNet will provide fuses for this switch which is the ICP for the Installation.

12.3 LV Connections from a Substation on an Installation Owner's Property

12.3.1. Transformers up to 300kVA

For transformer capacities up to 300kVA Mains protection will be provided by LV HRC fuses or a Circuit Breaker mounted adjacent to the transformer.

12.3.2. Transformers greater than 300kVA without an LV Interconnection

If a transformer capacity is greater than or equal to 300kVA and it is dedicated to supply one Installation with no LV interconnection, the LV Mains may be connected directly to the transformer LV terminals.

To ensure the transformer HV fuses can detect phase to earth faults at the main switchboard, the Mains shall be sized to carry the rated current of the transformer and may only be longer than 20 metres with special approval by PowerNet.

Transformer HV fuses provide short circuit protection only for LV Mains. Installation Owners are required to provide overload protection that will operate their incoming circuit breaker.

12.3.3. LV Supply from a Substation with an LV Interconnection

When an Installation is supplied from a transformer that is primarily for supply of that Installation but also has an interconnection with the LV Network, the Mains will be protected by HRC fuses for connection capacities up to 400 amps and by a Circuit Breaker for connection capacities between 400 and 800 amps.

12.4 Protection of HV Connections

The HV Mains for Installations supplied overhead are generally protected by the feeder protection at the Network Zone Substation. If Installation protection is provided it must be designed to discriminate with the Network protection such that faults within the Installation beyond the incoming Circuit Breaker or fuse switch will not normally result in tripping of a Zone Substation feeder Circuit Breaker.

12.5 Unbalanced Voltage

It is possible for one or two fuses of a three phase set protecting Mains or a transformer to operate, resulting in an unbalanced or reduce voltage to occur at an Installation. PowerNet will not accept responsibility for any damage to Installation equipment caused by this condition. If Installation Owners have equipment vulnerable to damage by unbalanced or reduced voltage they are advised to install their own protection that will automatically disconnect the appropriate equipment.

13. Metering

13.1 General Metering Requirements

Installation Owners are responsible for providing appropriate space within their premises to accommodate all metering and load equipment required by PowerNet and the Electricity Retailer.

13.2 Metering Requirements for All Installations

The meter enclosure shall be in a location readily accessible by metering personnel. The enclosure must have a minimum clear depth of 120mm from the meter mounting surface to any enclosure doors, etc.

The meter board or box shall be installed to comply with all current electricity industry regulations or requirements.

The Installation Owner is responsible for the installation of the Mains into the meter enclosure and the sub-circuits leaving the enclosure for uncontrolled and any controlled loads. These circuits shall have sufficient length to be terminated on to meters and load control equipment. The Installation electrician shall terminate the service main neutral and provide a suitable lead for a neutral shunt connection to the metering equipment.

13.3 Additional Requirements for CT Metering

Provision shall be made in the main switchboard to accommodate the metering current transformers and provide a metering potential supply.

The Installation Owner is responsible for providing or arranging and installing the following equipment, to meet the current electricity industry legislation or requirements:

- Certified metering CT's
- CT Shorting/Test Block
- Primary Potential Fuses at the main potential connection
- Secondary Potential Fuses in metering compartment

Suitably rated fuse links must be chosen for the potential fuses to ensure discrimination, such that metering compartment fuses would operate first in the event of a fault inside the compartment, or metering.

13.4 Network Metering and Load Control – EIL and TPCL Networks only

PowerNet requires all installations to have a network owned smart meter which measures the whole load of the installation. Its function is to collect load information from the installation for network operational purposes. This can be achieved by utilising network owned revenue metering

via Metering Equipment Provider (MEP) SmartCo. If an alternate MEP is employed, a separate network meter must be fitted in series, normally prior to the revenue meter, such that it measures the full load of the installation.

Where existing network owned (EIL, TPCL or SmartCo MEP) revenue metering is installed at a premises and the Electricity Retailer wishes to use an alternative MEP for their revenue metering; then the new MEP's meter must be installed in series with the network meter such that network owned meter continues to carry the full installation load. The Network meter will also provide any load control switching for controlled tariffs.

Load control switching for controlled tariffs, etc, will be via load control contacts within the network meter. The meter's load control contacts will respond to existing ripple control signals broadcast across the electricity network, however in the longer term the ripple control function will be replaced by signals directly to the meter via the smart meter radio communications system. Therefore, for continuation of load control functions the meter must be have its radio communications module connected and operational.

PowerNet's Load Control Devices are able to switch directly loads up to 40 amps single phase. Where the Installation controlled load exceeds this, the Installation Owner will be responsible for the supply and installation of a suitable auxiliary control device. The installation and connection of the meters and Load Control Devices is the responsibility of the Electricity Retailers chosen MEP. If an Installation Owner requires extra or enhanced metering the Installation Owner shall meet the extra costs.

If Installation Owners carry out work on their own premises which require breaking of meter seals, e.g. relocation of the meters or meter boards, arrangements must be made with the Electricity Retailer responsible for the site.

13.5 Limits of Whole Current (WC) Metering and CT Metering

Contract Supply Capacity up to and including 50kVA (80A ICP fuse)

- May be metered with a whole current (direct wired) meter, with no further restriction, or.
- If CT meters are required for Installations with less than 80 amps, this should be specified by the Installation electrician on the PowerNet Installation Connection Application form.

Contact Supply Capacity of 75kVA (100A ICP fuse)

- Whole current (direct) metering may be utilised, providing a 100A MCB 'Curve – B' is fitted in series with the meter to limit the current through the meter to that of the 100A MCB, or.
- If there is no current limiting MCB as above, CT metering must be employed.

Contract Supply Capacity of 100kVA (160A ICP Fuse)

- Must have CT metering.

Contract Supply Capacity greater than 100kVA (Individual Line Charge based on measured actual load)

- Must have CT metering, and.
- Must have full Half Hour (HHR) metering that can report either kVAh with PF or kWh with kVAh, where the electricity retailer provides metering data each month using industry standard format, ie EIEP3.

Appendices

Appendix 1 – Capacity Guarantee Agreement

Introduction

Any appliance which is part of an electrical installation requires the electricity network to have sufficient investment in lines etc. to be able to convey electricity to that appliance in accordance with all statutory legislation and sound engineering practice.

The investment required in and hence the capacity of the Network has to satisfy the Contract Supply Capacity of the installation.

For new Loads or Load increases in excess of 100kVA, the line charges in general relating to network investment recover the costs over the life of the assets which on average is 40 years.

The Capacity Guarantee Agreement is designed to reduce the risk to PowerNet of stranded or underutilised capital assets and negate the need for large “headworks” or capital contribution often required by other line companies.

The Capacity Guarantee Agreement enables PowerNet to recover the balance of its investment if the Installation Owner wishes to reduce the Contract Supply Capacity before 10 years has elapsed.

Application of Capacity Guarantee Agreement

A Capacity Guarantee Agreement will be required in the following situations:

- A new installation connection requiring a Contract Supply Capacity of 138kVA or greater.
- An existing installation increasing Contract Supply Capacity by greater than 100kVA.

PowerNet will carry the risk on smaller installations.

The Capacity Guarantee Agreement will be applied **in addition to** and not instead of a Capital Contribution if the distribution system has to be significantly extended beyond the economic value and there is an unacceptable risk to PowerNet of stranded assets.

The term of the Capacity Guarantee Agreement will be 10 years.

As an alternative to the Capacity Guarantee Agreement the consumer may opt to pay an annual payment equal to between 10% and 20% of the Capacity Guarantee Agreement for the 10 year period. The actual percentage would depend on the estimated or perceived risk of underutilised or stranded assets, i.e. a type of ‘beta’ factor. The first annual payment would be payable in advance and prior to the commencement of any work.

A consumer can transfer from paying the annual payment to take out a Capacity Guarantee Agreement at any time during the 10 years, but a consumer cannot transfer from a Capacity Guarantee Agreement to the annual payment option.

There is also an option for a consumer to take out a shortened term Capacity Guarantee Agreement and an annual payment for that period which would cover the difference in the Capacity Guarantee for each year.

Embedded Networks

Embedded Network owners are required to take supply capacity in steps equivalent to the PowerNet standard transformer sizing.

Two options are available for embedded networks. The first is based on a Capacity Guarantee Agreement for each new capacity supply level, with (distributors charges and Transpower Connection charges) based on the total capacity and the variable Transpower Interconnection Charge based on actual coincident peaks. The second option is to pay a fee of three times the distributor's portion of the incremental step capacity annual line charge and pay line charges during the period up to the time the capacity reaches the step value based on actual capacity connected.

Appendix 2 – Installation Connection Application Form

INSTALLATION CONNECTION APPLICATION		PowerNet Use	
POSTAL ADDRESS PO Box 1642 Invercargill www.powernet.co.nz		OFFICES 251 Racecourse Road, Invercargill 92 Charlotte Street, Balclutha Telephone: 03 211 1899	
		Facsimile: 03 211 1880 Facsimile: 03 419 0141	
		ICP Number _____ Reference _____ Contact Person _____ Form Number 42801	

Section 1 – To be completed by the Installation Owner – Please read notes overleaf

Applicant Name and Present Postal Address	(Business/Surname) _____ (First Names) _____ Phone: _____	
Reason for Application and Location of Installation to be Supplied (See Note 3)	Tick applicable boxes (For Builders Temporary Supply – See Note 1) <input type="checkbox"/> New connection <input type="checkbox"/> Change contract supply capacity <input type="checkbox"/> Installation of notifiable load (eg motors – See Note 2) <input type="checkbox"/> Alteration to existing installation (eg change of mains)	
	Type of Premises _____ Flat/Unit No. _____ Rapid/Street No. _____ Road/Street Name _____ Town/Locality _____	
Loadings (See Note 4)	kW	Comments
Uncontrolled Load or Day use on Day/Night Metering		
Special tariff Controlled Loads or Night use on Day/Night Metering		
Other relevant information: (eg relocation of meters, or details of specials loads)		
Mains: Overhead Type/Size _____ Length _____ (See Note 7) Underground Type/Size _____ Length _____ Internal Type/Size _____ Length _____		Contract Supply Capacity
		Domestic – Small - Single Phase (32A CB) (See Note 6) <input type="checkbox"/> Peak <input type="checkbox"/> Off Peak <input type="checkbox"/> Low User <input type="checkbox"/> – Standard - Single Phase (63A Nominal, 80A on special request) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> – Special - Multi Phase (63A max) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Non Domestic – 1kVA Single Phase (5A) <input type="checkbox"/> – 8kVA Single Phase (40A max) <input type="checkbox"/> (See Note 6) – 20kVA Single Phase (80A max) <input type="checkbox"/> – 15kVA Three Phase (20A) <input type="checkbox"/> – 30kVA Two Phase (63A max) <input type="checkbox"/> – 30kVA Three Phase (40A max) <input type="checkbox"/> – 50kVA Three Phase (80A max) <input type="checkbox"/> – 75kVA Three Phase (100A max) <input type="checkbox"/> – 100kVA Three Phase (160A max) <input type="checkbox"/> Individual – Greater than 100kVA Specify _____ May require a Capacity Guarantee
Name of Electrician: _____ Company: _____ Address: _____ Phone: _____		
I apply to connect the above installation to PowerNet's Network. I agree to the terms on the back of this form and agree to pay all PowerNet's Connection Fees		Date Supply Required: _____
My Electricity Retailer will be: _____ Signed: _____		Date: _____

Section 2 – For PowerNet to complete

Network Connection Point: _____	Ripple Receiver Area/Channel: _____
Service Fuse: _____ A Transformer: _____	Approved: _____ Date: _____
New Supply Capacity <input type="checkbox"/> Raised in database Actioned: Batch Number: _____ Initials: _____ Date: _____	

Section 3 – To be filled out by Registered Electrical Inspector(s) on completion of work in preparation for connection to network.

The following are declarations that Certificate(s) of Compliance exist for this installation as indicated, and it is ready for connection to the PowerNet network.

Certificate of Compliance Number: _____	Covers <input type="checkbox"/> Building Installation <input type="checkbox"/> LV Mains and Earthing <input type="checkbox"/> HV Mains	Registered Electrical Inspector Name: _____ Number: _____ Signed: _____ Date: _____	
Certificate of Compliance Number: _____	Covers <input type="checkbox"/> LV Mains <input type="checkbox"/> HV Mains	Registered Electrical Inspector Name: _____ Number: _____ Signed: _____ Date: _____	

Section 4 – To be completed by Person Livening Supply

I certify all prelivening checks as required by Electricity Regulations and requirements of PowerNet Installation Connection Standard have been complied with, and the supply has been livened.

<input type="checkbox"/> Meters/Relay Installed <input type="checkbox"/> Polarity and Phase Rotation Correct <input type="checkbox"/> Main Earth	Fuse Size: _____ <input type="checkbox"/> Main CB checked / sealed
Signed: _____ Date: _____	

GUIDE TO COMPLETING THE POWERNET INSTALLATION CONNECTION APPLICATION

General Information

Policies relating to Installation Connections are contained in the PowerNet Installation Connection Standard. This is available on the PowerNet website www.powernet.co.nz.

This form must be used for all situations where a formal application is required by the PowerNet Installation Connection Standard.

The Installation Owner, (not the Electrician), must sign the form at the bottom of Section 1.

If full information is not supplied the form will be returned for more details.

Upon receipt of a correctly filled out Section 1 of this form, PowerNet will nominate or confirm the Network Connection point, determine any special conditions if appropriate, confirm the Contract Supply Capacity and the date for connection.

The Installation Owner will be advised by PowerNet of fees or other costs applicable. Upon receiving the installation owner's acceptance of the costs involved, this form will then be returned to the electrician with confirmation of the date of connection.

To avoid unnecessary delays for living of new installations, electricians should notify PowerNet as soon as the mains are installed and ready to connect to the network.

The installation will only be connected to the network when Section 3 of this form is fully completed. The completed form must be available on site together with the Certificate of Compliance for the PowerNet authorised contractor at the time of living. Failure to do so will cause delays.

Living of new installations will only take place following authorisation from an Electricity Retailer.

Notes

1. Builders Supplies are treated as the first stage of a new permanent connection. Consumer charges for the initial connection (of the BTS) are covered by the standard cost/charges calculation, and will be based on the final supply capacity. Any subsequent alterations follow the normal policies for an alteration to an existing connection, ie any costs will be the consumer's responsibility and applications are required for: Change of Supply Capacity; Change of Mains; Relocation of Metering – Note a meter box on the end of permanent mains being simply repositioned onto the building does not constitute relocation and does not require an application, however the electrician is responsible for having the meters recertified if seals are broken during connection of the new internal mains.
2. Details including starting method of motors above the notifiable limits must be given on a separate Motor Application Form. Installation of electric motors and welders may be subject to special conditions – refer Electricity Regulations. Note also the requirements of the PowerNet Installation Connection Standard regarding power factor.
3. It is important that the best possible description be given for the location of the installation. It is most desirable that a street number for urban areas, or a RAPID number in rural areas, be given.

LOCATION DETAILS ARE TO BE SHOWN ON AN ACCOMPANYING SITE PLAN, AND IF POSSIBLE SHOWING LABEL NUMBER OF ANY EXISTING POWERNET POLE(S).


- The type of premises describes the main use of the installation, eg House, Hotel, Dairy Shed, Shop, Pump, Factory, etc.
4. To qualify for Off Peak contract supply capacity a minimum of 25% of total energy usage must be on a controlled, separately metered rate, or be on the night rate of day/night metering.
Actual tariffs must be arranged with Electricity Retailer, but suitable information to support an application for Off Peak contract capacity must be given.
 5. To qualify for Low User (10% Fixed Line Charge) option energy usage must be at least 1000kWh for each four month period of the year (ie this option is not available for holiday homes with seasonal usage patterns). This option is only available for standard and special domestic supply capacities, and Peak or Off Peak option must also be chosen as appropriate. For details of rates that will be charged consult the Electricity Retailer. For OtagoNet Joint Venture area please enquire as to availability.
 6. Small Domestic and 8kVA options are not available in OtagoNet Joint Venture area.
 7. Total length and size of mains to the metering point must be noted, including overhead, underground and internal sections.

TERMS

1. This application, correspondence relating to it, and these terms constitute a contract between the applicant and PowerNet.
2. The applicant confirms that the information supplied is accurate.
3. The applicant acknowledges that PowerNet will incur costs to provide the contract supply capacity and agrees not to reduce it for twelve months from the date of connection.
4. PowerNet's sole obligation is to provide the applicant with an ability to use PowerNet's network. The applicant will have to make separate arrangements for the supply of electricity with an electricity retailer.
5. This application, correspondence relating to it, and these terms contain the entire understanding and the whole agreement between PowerNet and the applicant relative to the connection of the installation. All previous and other negotiations, representations, warranties, arrangements, and statements (if any) whether expressed or implied (including any collateral agreement or warranty) with reference to the connection of the installation are otherwise excluded and cancelled. This exclusion does not limit any rights the applicant may have under the Consumer Guarantees Act 1993.

Craig 103737

Appendix 3 – Motor Application Form



MOTOR INSTALLATION DETAILS

(Supplementary information to be used in conjunction with a PowerNet Installation Connection Application)

ICP No.

Application Form No.

Section 1 - Installation Details to be completed by Applicant:

Applicant Name:		Type of Premises:		Locality:	
Location of Premises:		Road/Street No:		Road/Street Name:	

Schedule of Motors to be installed, to be completed by Applicant:

No. of this type/use	Phase	Size (kW)	Type eg Squirrel Cage or NEMA type or similar industry description	Starting			Power Factor Correction		Will Motor be used for braking/plugging	Can/will start with Motor No(s)	Load characteristic, and any other relevant information For motors larger than 100kW it is desirable that full details of motor characteristics for starting and running are provided, i.e. manufacturers information/specifications
				Method e.g. DOL, Star/Delta Soft Start	Characteristics Starting Amps Time Delay Seconds % of Full Load	No. of starts per day	Bulk	Individual			
1										Yes/No	
2										Yes/No	
3										Yes/No	
4										Yes/No	
5										Yes/No	
6										Yes/No	
7										Yes/No	
8										Yes/No	
9										Yes/No	
10										Yes/No	

Section 2 – Approval to be completed by PowerNet Limited:

Approval to install motors as above is given in the belief there will be no adverse effects at your point of connection to the PowerNet network, but if this should eventuate you may still be held responsible for any remedial costs.

This approval is limited to the effects at the network connection point, and does not consider any effects that may occur within your own installation.

Signed: _____ Date: _____

Appendix 4 – Customer Connection Service Standards

New/Altered Supply With No Line work

Within five working days:

- 🕒 Letter of confirmation to customer into mail.
- 🕒 Approved application to electrician with letter into mail.

New/Altered Supply Where Line work is Required

Minor Line work – within 10 working days:

- 🕒 Job costed and customer charges calculated.
- 🕒 Customer letter/quote into mail.
- 🕒 If no customer charges, application/letter to electrician into mail.

OR

Major Line work – within 20 working days:

- 🕒 Job costed and customer charges calculated.
- 🕒 Customer letter/quote into mail.
- 🕒 If no customer charges, application/letter to electrician into mail.

Where No Customer Charges, or on Customer Acceptance of Costs

Within 20 working days:

$\frac{3}{4}$ Line work completed.

Notification of Ready to Liven

All line work (if any) having been previously completed as above – within five working days:

$\frac{3}{4}$ Installation metered and livened.

Builders Supply

Where application is received with Section 3 already complete (i.e. electrician's work is completed, including certification) – within five working days:

$\frac{3}{4}$ Supply metered and livened.

General Inquiries

Within five working days:

$\frac{3}{4}$ Written estimation of costs, detailing basis for estimate.

Urgency

While the above are nominal maximum timeframes, genuine urgency will be accommodated where possible. This must not be to the extent that it causes excessive delays to other programmed work.

Appendix 5 – Aerial Mains Arrangement

