



C O U N T I E S P O W E R

Distribution Code

Part 2: Network Connection Standard

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Distribution Code – Part 2: Network Connection Standard

1.0 Introduction

This document provides information and outlines the technical requirements for parties seeking to connect their installation to the Counties Power network.

It is relevant to all stakeholders including electricity retailers, electricity users, developers, contractors, consultants and shareholders.

This standard forms part of our Distribution Code, which comprises six parts, all of which are available from Counties Power's website www.countiespower.com, each covering a specific set of requirements

Part 1: General Requirements

Part 2: Network Connection Standard (this document)

Part 3: Metering Requirements for Electrical Installations

Part 4: Distributed Generation Requirements

Part 5: Signalling and Technical Interference

Part 6: Distribution Operation Code

Definitions of terms and abbreviations are found in section 14.1 of Part 1 of this code.

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2.0 Purpose

To establish guidelines for Low Voltage (LV) connections and High Voltage (HV) connections to the Counties Power distribution network.

3.0 Scope

This standard covers the physical and legal installation requirements for equipment necessary for establishing a consumer point of supply to the Counties Power network.

This standard also covers the work processes to be followed by the installer of the equipment and the connection of a customer mains cable, as well as the recording of data associated with the work carried out.

Ownership and Maintenance responsibilities and network demarcation points are outlined in Counties Power document – “Network Demarcation Standard”.

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4.0 Policy

All new LV connections (rated up to 160A) to Counties Power's network shall be made via a pillar box, with some exceptions as detailed in section 7 below.

All new LV connections (rated over 160A) to Counties Power's network shall be assessed and designed on case by case basis by Counties Power network designers. The detailed requirements of these type of connections are not covered by this standard, as they will be site specific.

All new HV connections to Counties Power's network shall be designed on a case by case basis and connection shall be made via a drop out fuse or overhead switch¹ (for overhead) or ring main unit (RMU) (for underground) which will provide a point of isolation. Where a Counties Power line, cable or transformer is to be installed in private land, then an easement in favour of Counties Power will be required for that equipment.

All equipment (e.g. pillars, lines, transformers) shall be installed, tested and connected in accordance with this standard.

5.0 References

All designs and construction activities shall comply, where applicable, with the Electricity Act 1992 and Amendments, the Electricity (Safety) Regulations 2010, Electrical codes of practice (in particular NZECP 34 and NZECP 35), AS/NZS 3000, AS/NZS 4026:2008, Health and Safety at Work Act 2015 (HSWA), the Safety Manual – Electricity Industry, equipment manufactures' maintenance manuals and Counties Power approved standards, drawings and methodologies.

6.0 Definitions

POS: Point of supply, in relation to a property, means the point or points on the boundary of the property at which exclusive fittings enter that property, except that, -

- if there are both high voltage lines and a transformer owned by the electricity distributor on the property, the point of supply is the point at which electricity from the transformer enters exclusive fittings; or
- if there are non-exclusive fittings on the property, the point of supply is the point at which those fittings become exclusive fittings; or
- if the exclusive fittings on the property are owned by a consumer that is a tenant or licensee of the owner or occupier of the property, the point of

¹ Where required to prevent ferroresonance in long cable runs as per design guidelines

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supply is the point at which those exclusive fittings enter the area leased or licensed by the consumer; or

- if there is specific agreement that any other point on the property is the point of supply, the point of supply is the agreed point.
- **NCP:** Network connection point is the nearest location in the Counties Power network, such as an overhead line pole or pillar box, that can supply the consumer.
- **GXP:** Grid Exit Point, where Counties Power takes supply from a nominated Transpower Substation connection point.
- **Rural:** Area as designated by local councils².
- **Urban:** Area as designated by local councils.
- **Pillar box:** A small (usually plastic, black or green) box located on the road reserve or on private property which contains the fuses for individual consumers connected to the Counties Power network.
 - **Counties Power pillar box:** A pillar box installed on the road reserve (outside of the boundary) and owned by Counties Power. Counties Power can own pillar boxes installed inside private property by agreement.
 - **Private pillar box:** A pillar box installed on private property which is privately/jointly owned by one or more consumers connected to that pillar, unless agreed with Counties Power.
- **HV:** High voltage, operating at 11kV, 22kV, 33kV and 110kV.
- **LV:** Low voltage, operating at 400V and below.

7.0 New Connections

All new low voltage connections to the Counties Power network are generally underground and the cost of the connection is covered by the customer making the request.

Connection capacities up to 3 phase 60 amps are usually available from the LV distribution system. Where no LV distribution system is available, Counties Power will need to extend the LV network from an adjacent location, or install a new transformer to provide LV supply.

² Boundaries generally identified within unitary plans

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Connection capacities between 160 and 400 amps may require the installation of a shared or dedicated transformer on, or adjacent to, the Consumer's property.

Where a network extension or transformer installation is required, it will be subject to a capital contribution payment towards installation of the LV and HV equipment.

Supplies to urban installations shall be single phase, unless otherwise agreed by Counties Power Limited.

Supply to rural dwelling installations is recommended to be three phase and **shall** be a minimum of two phase and the connected load balanced across all connected phases at the Main Switchboard.

7.1 LV Connections

7.1.1 Builder's temporary supply

Requests for temporary supplies shall be treated on an individual case-by-case basis. Counties Power will actively encourage electricians to lay the customer mains cable for use as the builder's temporary supply. Where a builder's temporary supply cable is to be used only for that purpose, it shall be disconnected before the permanent customer mains cable is connected.

Temporary supply power outlets shall not be fixed to Counties Power's assets. This includes (but not necessarily limited to) distribution Service Boxes, Pillar Boxes, Link Boxes and overhead HV and LV Distribution poles.

Detailed requirements for Builders Temporary Supplies (underground and overhead) are found in Appendix A

7.1.2 New underground service connections

In areas supplied by underground LV circuits, all new connections rated up to 160A shall be via a pillar box in preference, although, if location constraints require a service pit to be used, then this will be considered on a case by case basis, and Counties Power management approval will be required.

Pillars shall only be installed in new installations where there is suitable protection against damage such as a wall, fence or other structure or it is able to be located away from normal vehicle access.

Pits are to be used in narrow, congested or unprotected open spaces, or where the likelihood of vehicle damage is high (e.g. in main streets, CBD, some driveways).

Note: Connections to existing underground LV circuits installed on private land (e.g. inside the property boundaries, right of ways) will be subject to a registered

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easement in favour of beneficiary of supply or Counties Power if necessary. The easement shall be arranged at no cost to Counties Power.

7.1.3 In areas supplied by the overhead LV lines

In areas supplied by overhead LV circuits, all new underground service connections rated up to 160A shall be via a pillar box. Counties Power will install the cable from the pole top and install the pillar box at the boundary. The customer will be charged the full cost of this work.

In rural areas, where overhead LV service lines may be constructed, Counties Power will allow connection of LV service lines (overhead) directly to the overhead network, following the installation of appropriate service cross arms and fusing.

Where the connection pole has existing connections (a maximum of three service connections will be allowed on a pole) a service pillar shall be installed at the base of the pole for the new connection. The new connection(s), rated up to 160A, shall be via the installed pillar. The customer will be required to pay a contribution towards the new pillar installation. For situations with greater than three connections in total, the existing underground connections will be re-connected into the new pillar to ensure no more than three pole top connections exist.

Note: Connections to existing overhead LV lines located on private land (e.g. inside the property boundaries, right of ways) will be subject to a registered easement in favour of beneficiary of supply or Counties Power if necessary. The easement shall be arranged at no cost to Counties Power.

7.1.4 Multiple connections per lot

Where there are multiple connections per lot, apartments, back-lots or right of way accessed dwellings the following criteria shall be followed:

- Between 3 and 5 connections per lot may be supplied via a fused pillar on the boundary
- Greater than 5 connections per lot, or apartments, shall have a fused boundary pillar with a single three phase fuse disconnect unit, with internal reticulation and fusing provided by the customer

7.1.5 LV connections over 160 Amps

For all new connections, where a capacity of over 160 Amps is requested, Counties Power will need to assess network requirements for accommodating additional load. The customer will be charged a contribution towards the works required to establish the point of supply.

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7.2 Service Mains Requirements

Urban Areas:

Supplies to urban dwellings are normally single phase unless otherwise agreed with Counties Power.

In the interest of safety, Counties Power recommends that underground service cables be Neutral Screened. Where cables are not neutral screened, appropriate mechanical protection shall be installed and maintained as appropriate.

The Electrical Contractor shall specify the service mains sizing such that the volt drop requirements of the Electricity Regulations are satisfied (taking into account the length of the service main, the designed load and future load) except that the minimum size of an underground service main shall be 16mm² with copper conductors.

Rural Areas:

Supply to rural dwelling installations is recommended to be 3 phase and shall be a minimum of 2 phase.

In the interest of safety, Counties Power recommends that underground service cables be Neutral Screened. Where cables are not neutral screened, appropriate mechanical protection shall be installed and maintained as appropriate.

The Electrical Contractor shall specify the service mains sizing such that the volt drop requirements of the Electricity Regulations are satisfied (taking into account the length of the service main, the designed load and future load) except that the minimum size of an underground cable service main shall be 16mm².

Underground long run cables of greater than 25mm² shall be 'tailed down' to a size appropriate to the termination capability of the main switch (generally 25mm² copper). The joint should be made immediately outside the foundation of the building, beneath the meter box position.

Underground aluminium cables may be single core, multi stranded, providing all cables (3 phases and neutral) follow the same lay line, i.e. installed in a common trench (minimum size recommended is 70mm²). Copper tails or bi-metal lugs with copper palms shall be used to terminate cables.

Overhead Service Mains:

The minimum size aerial conductor to be used is "fluorine"

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7.3 HV Connections

7.3.1 Direct HV Supply to Customer

Any consumer is able to take supply from the Counties Power HV network, however, it is generally only economic where the required capacity exceeds 1MVA or when the Consumer has a special need for an HV supply (e.g. an industrial installation).

Typical configurations for HV network connections will be via an incoming isolation device such as dropout fuses, circuit breaker, isolator, or fuse switch. The incoming isolation device will be supplied and maintained by Counties Power, but the consumer shall provide suitable accommodation for this equipment (if ground mounted).

Where a private HV underground connection is being made to the network, it will be made via either a three phase gas switch or a RMU³ installed on the road reserve. This is to provide ganged three phase switching to avoid any ferroresonance issues during switching operations.

7.3.2 LV Supply to Customer requiring HV Line/Transformer

In the areas where there is either a large distance (over 300m) between the consumer installation (63 Amps) and nearest point of supply, or the connection is over 160 amps, the installation of a distribution substation (or transformer) may be required. The consumer will be charged a contribution towards the work required.

When it is necessary (as a result of network assessment) to install a distribution substation on a Consumer's premises, the consumer shall make available on the Consumer's premises suitable space to accommodate the transformer, HV cable or line, associated switchgear and metering equipment.

Note: For all new distribution substations⁴ installed on private land or new connections of the existing distribution substations installed on private land, a registered easement in favour of Counties Power Ltd is necessary. The easement shall be arranged at no cost to Counties Power. Older assets forming the distribution network, installed on private land or within buildings before 1 January 1993, are protected under existing use rights in the Electricity Act 1992, section 23.

8.0 General

All network extensions shall be designed, constructed and maintained to minimise as far as reasonably practicable, the risk of injury to person or damage to property due to failure of the works.

³ An RMU generally consists of at least one switch and a circuit breaker

⁴ A substation includes a 11/22kV:400V transformer plus associated switchgear and earthing

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8.1 Qualification and training

Only authorised persons may install, test and live equipment (e.g. pillar, pit) or enter equipment to make customer connections (disconnections) to (from) the Counties Power's LV distribution network.

An authorised person will be a suitably qualified and experienced individual, who has undergone specific training and demonstrated an acceptable level of competence and is a Counties Power approved contractor.

8.2 Service pillar (Pillar box) and LV Cable location

Pillar boxes will generally be located at every second section side boundary, no more than 100mm from the road reserve boundary.

The standard installation location for the distribution network cable is in the road reserve within 800mm of the boundary. The LV cable is usually installed with 600mm cover below ground level, at a distance of 400 to 600mm from the boundary.

Use of service pits can occur in special circumstances. Where service pits are used, the service pit shall be installed directly above the distribution network cable. The service branch tee-joint shall be located not less than one meter from the service pillar or pit in order to achieve an adequate bending radius for the service branch cable at the entry hole in the base of the service pillar or pit.

8.3 Foundations

Pillar box shall be installed within suitable foundation material and if required, soil support enhancement such as concrete or coarse metal shall be used. Backfill around cabling shall not be sharp or present a risk of damage to network or consumer cabling.

8.4 Earthing

For underground distribution systems using pillars, the neutral conductor shall be earthed at intermediate pillars where the cables are bolted, and at end of runs. Neutrals shall be bolted through and earthed at all link pillars.

Where service pits are used, the service branch neutral conductor shall be earthed at every third service pit, or alternatively at an adjacent service pit that has a spare neutral connector port (where pits are used exclusively).

The earth will comprise of either a driven electrode rod located adjacent to the base of the service pillar or pit in the bottom of the trench, or an exposed length of copper conductor laid in the bottom of the trench. Refer to Counties Power Network Standard Drawing *STD-2B2-43 Pillar General Arrangement* (includes earthing details).

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8.5 Counties Power cable types

XLPE insulated cables are acceptable and preferred, and require a transition joint to suit the pillar box. Refer to Counties Power Network Standard Drawing *STD-2B2-43 Pillar General Arrangement* (includes details of cable breakout).

8.6 Consumer Service Mains and Builder's temporary cables

Neutral-screen copper cables are acceptable and preferred, and do not require a transition joint to suit the pillar box.

The customer's electrician shall lay the cable to the boundary adjacent to the service pillar or pit and leave a 1400 mm length of cable coiled for connection within the service pillar or pit by Counties Power.

8.7 Metering requirements

Metering requirements for electrical installations are outlined in the Counties Power Distribution Code Part 5 Metering Requirements for Electrical Installations.

8.8 Meter Box Size Requirements

Urban Areas:

The minimum size of meter box shall allow for the mounting of up to 3 meters, in a readable position, and 1 load control device. Other equipment and wiring within the meter box shall not obstruct the installation of the meters in the readable position. All meter boxes shall provide a weather proof reading window.

Rural Areas:

The minimum size of meter box shall allow for the mounting of up to 4 meters, in a readable position, and 1 load control relay. Other equipment and wiring within the meter box shall not obstruct the installation of the meters in the readable position. All meter boxes shall provide a weather proof reading window.

8.9 Distributed generation installation

All Generators connected to Counties Power's Network, or to an Installation connected to Counties Power's Network, shall comply with the requirements of Counties Power Distribution Code Part 4: Distributed Generation Requirements.

Where a Consumer has generating equipment installed for emergency power supply purposes, suitable interlocks shall be provided that prevent the generator being connected to the network and exporting energy.

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8.10 Load balancing

All service branch cable connections shall be made phase continuous, i.e. service branch cable phase 'A' to distribution network cable phase 'A', etc. All service branch connections shall be three-phase tee-joints (i.e. all pillars and pits shall have three phases available internally).

In a new subdivision, fuse pillar and pit connectors shall be placed only on the phases of the service branch cable that are specified in the design for customer mains cable connections. Spare cores shall be capped. The design of the reticulation system shall allow for the loads to be balanced across all phases, which shall be achieved by placement of the fuse pillar and pit connectors.

8.11 Electrical tests

Electrical tests shall be performed on each service branch cable, builder's temporary supply (BTS) cable, and customer mains cable as an integral part of the electrical livening and safety certification procedure.

After running the service branch cable to the service pit or pillar and fitting connectors, but prior to fitting the customer's mains cable, the following electrical tests shall be carried out:

- **Polarity** – to verify the correct voltages at and between each phase conductor, and the neutral conductor.
- **Loop impedance** – to measure the loop impedance between the service branch neutral conductor and the phase conductor at the point at which the service connects to the Counties Power network.
- **Insulation Resistance** – to measure insulation resistance to indicate condition of the insulation between conductive parts. Polarisation Index test might also be required for HV cables.

Polarity and loop impedance tests shall also be completed prior to livening each customer mains cable.

Appendix A: Builders Temporary Supply (BTS) Requirements

a) Metering

All BTS installations will be metered.

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b) Special Requirements Relating To BTS Installations

All BTS installations shall be fully protected by a Residual Current Protection device. This shall either be incorporated in the Main Switch or in the outlet(s) protection, and may be incorporated in both.

All equipment shall be housed in a weatherproof box and mounted on a substantial pole. The pole shall be adequately buried, supported and suitable for long term use.

The box should have a top-hinged lid and provide a cut-out for the lead(s) to exit the enclosure.

A separate busbar shall be provided for both neutral and earth connections. (All under one bolt is not acceptable.)

All earth conductors shall be insulated or sleeved within the switchboard cavity.

A driven earth electrode of standard size shall be used on every installation.

c) Overhead Supplies

Termination structures shall be of sufficient strength and height to provide a minimum clearance of 2.7 metres, and 3.5 metres over areas used by vehicles.

Mains Entry Boxes are to be used.

Mains cables and earthing leads are to be adequately protected against mechanical damage.

d) Underground Supplies

Where required, mains cables shall be left long enough to reach the installation following the removal of the BTS and shall be properly protected from mechanical damage to below ground level.

A plastic marker shall be attached to indicate the presence of underground cables.

Note the metering requirements relating to booking inspections, metering and livening apply to BTS supplies.