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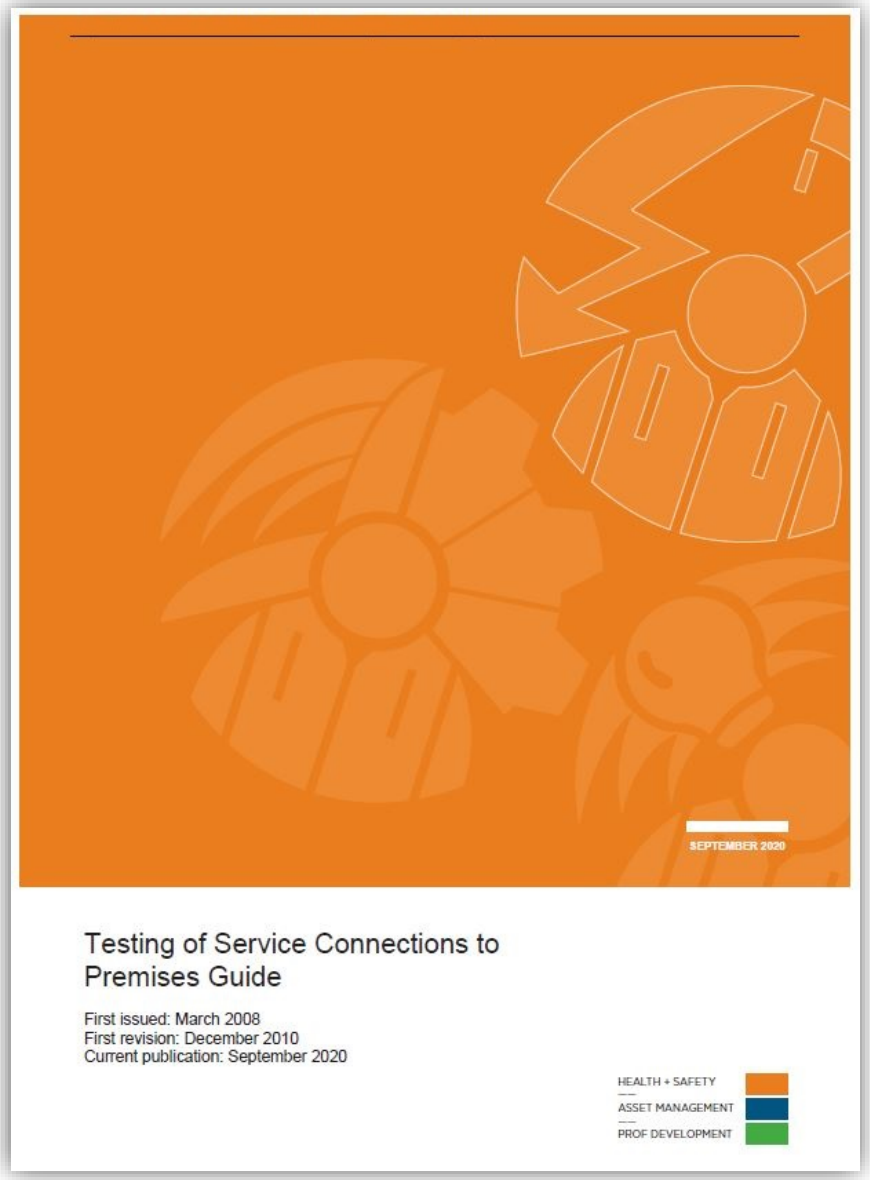
HEALTH & SAFETY

Testing of Service Connections to Premises Guide 2020

EEA.CO.NZ

Testing of Service Connections to Premises Guide 2020



Principals

Principles of Polarity Testing

The principle of polarity testing is to carry out checks to ensure that phase conductors and neutral conductors are not transposed, and that the neutral is continuous and earthed.

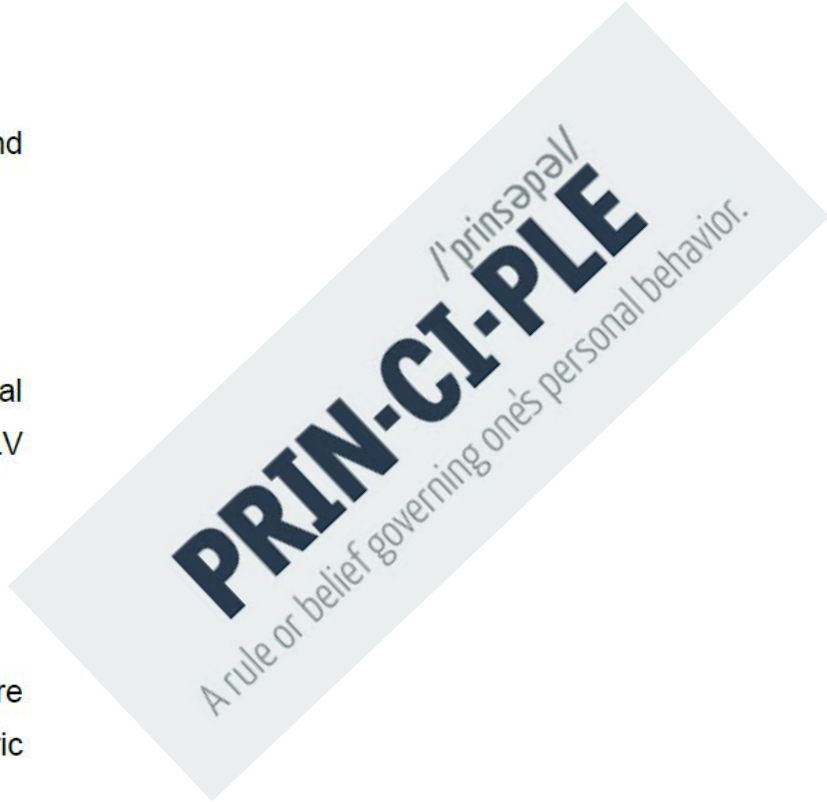
When Polarity Testing is Required

Polarity testing is required whenever the electric line (service mains), or any individual conductor of the electric line (service mains) are connected to the electric line (LV distribution), including reconnection following a disconnection.

Lines to Remain Disconnected if Testing Not Completed

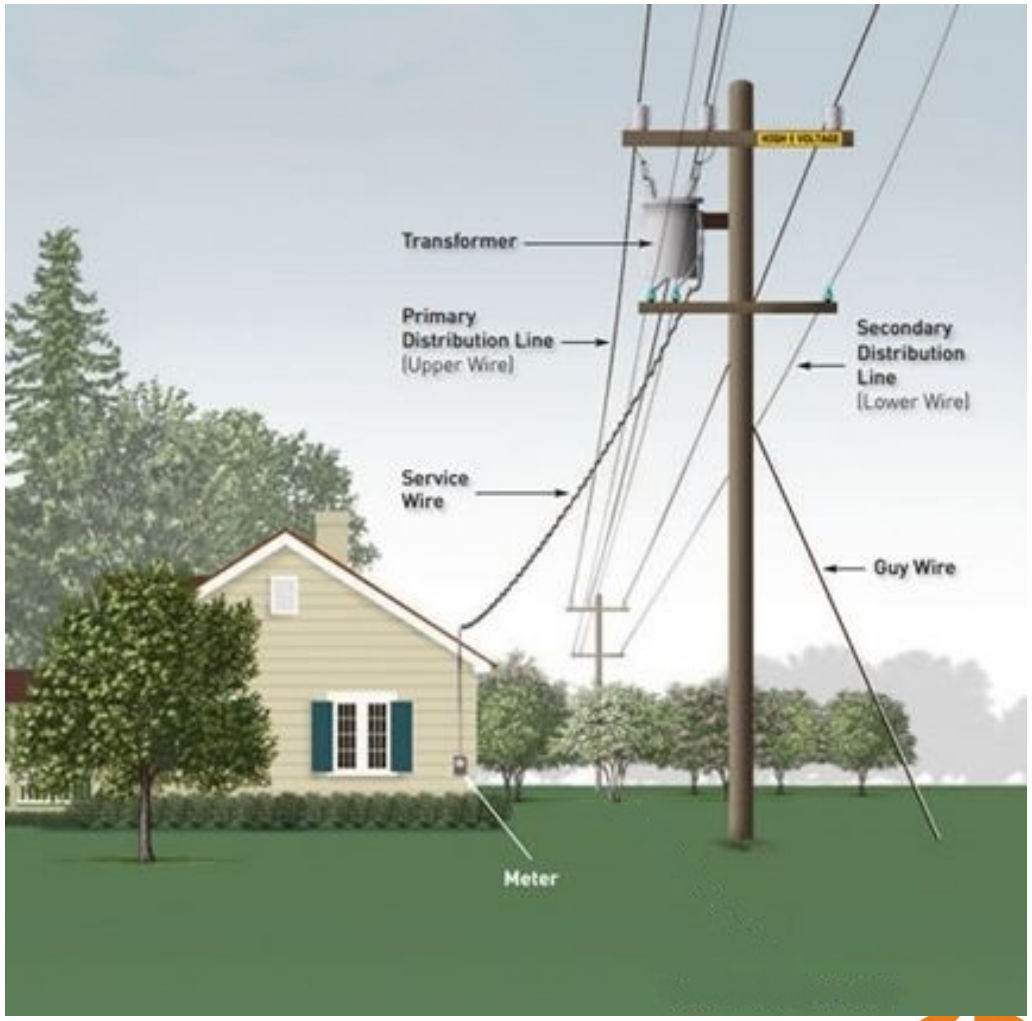
It is not sufficient to connect electric line (service mains) and leave fuses removed as there has not been a check that the neutral is not connected to a phase conductor of the electric line (LV distribution), lighting conductor or water heating pilot.

If a polarity test has not been carried out, cannot be carried out or cannot be completed, the electric line (service mains) (including the neutral) are to remain disconnected from the distribution lines.



Objectives

- To ensure the safe connection of low voltage service mains to premises/installations both in the case of new work and in the case of disconnection/reconnection for any purpose.
- To minimise the risk of shock or electrocution occurring to occupants.
- To minimise the risk of setting fire to the premises, damaging appliances or connected loads.
- To ensure the rating of the protection of the supply is checked.
- To ensure the installation is safe to connect.
- To comply with regulatory requirements.



Achieving

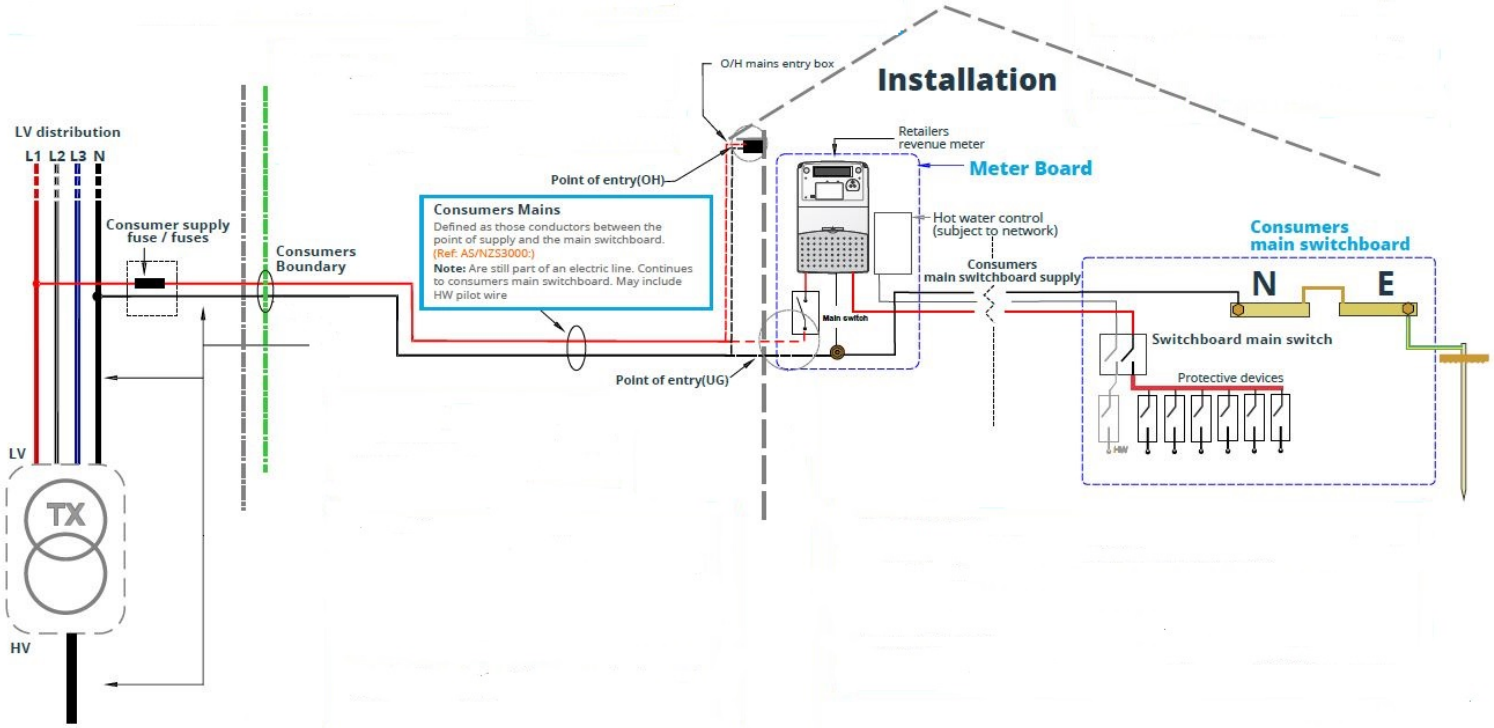
1. Polarity Testing.
- Prove the supply polarity is correct, and
- Prove neutral conductors are continuous and connected to the supply neutral.
- Prove rotation (3 Phase connections)

2. Fuse Rating

3. Neutral Integrity Testing.
- Prove neutral conductor connections.

4. Electrical Safety Certificate (ESC)
- A declaration that the installation is safe to use
- Issued by the person doing the final connectior not necessarily the person livening the installation.

Polarity Testing



Prerequisites.

- Network alive & free of defects.
- Installation main isolator open.
- Service main conductors disconnected. Phase/s & neutral at pole or service pillar.
- All other service & earth connections complete.

Prove & Connect.

- Identify & label network conductors.
- Identify & label service line conductors. (Service neutral identified by connection to earth.)
- Connect neutral conductor.
- Connect phase conductor/s.

Test & Liven.

- Voltage test across pole fuses. (Downer Procedure)
- Check fuse rating is correct for installation.
- Confirm safe to liven.
- Install service fuse.

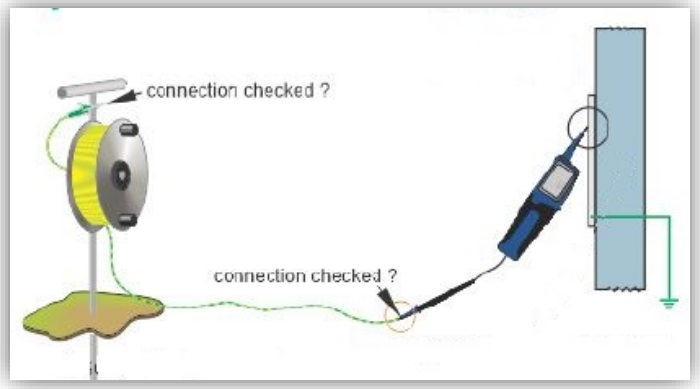
Polarity Testing

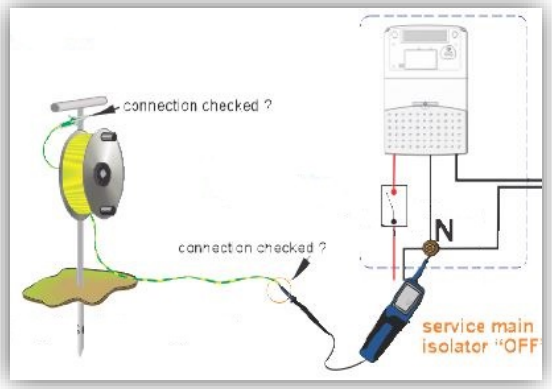
Post Liven checks.

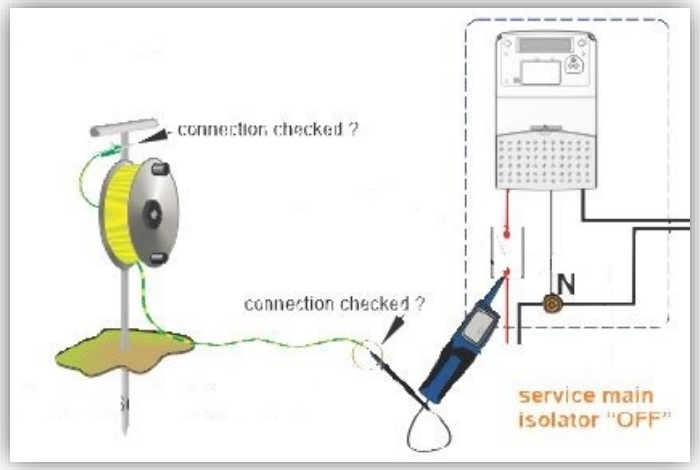
- Voltage test on exposed metal work.
- Voltage test on neutral bar.
- Voltage test on live side of main isolator.
- Voltage test phase to neutral.
- Phase rotation check for 3 phase installation.
- Neutral loop impedance test.

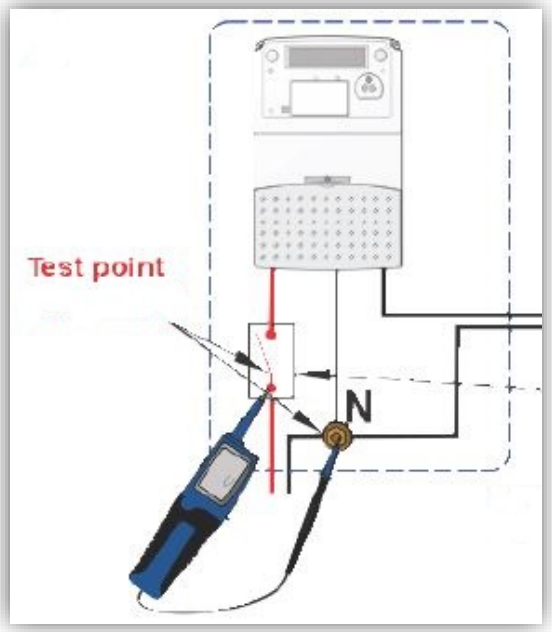
Test Results at Customer Connection Point

0.01 Ohms	Good
0.5 Ohms	OK
1.0 Ohms	Pass OK
1.0 Ohms	If close to Tx
2.5 Ohms	Check Connections Compare to other phases & consider amber defect. Voltage & protection devices will be affected.
>2.5 Ohms	Red Defect





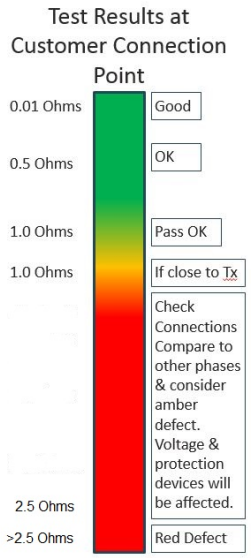


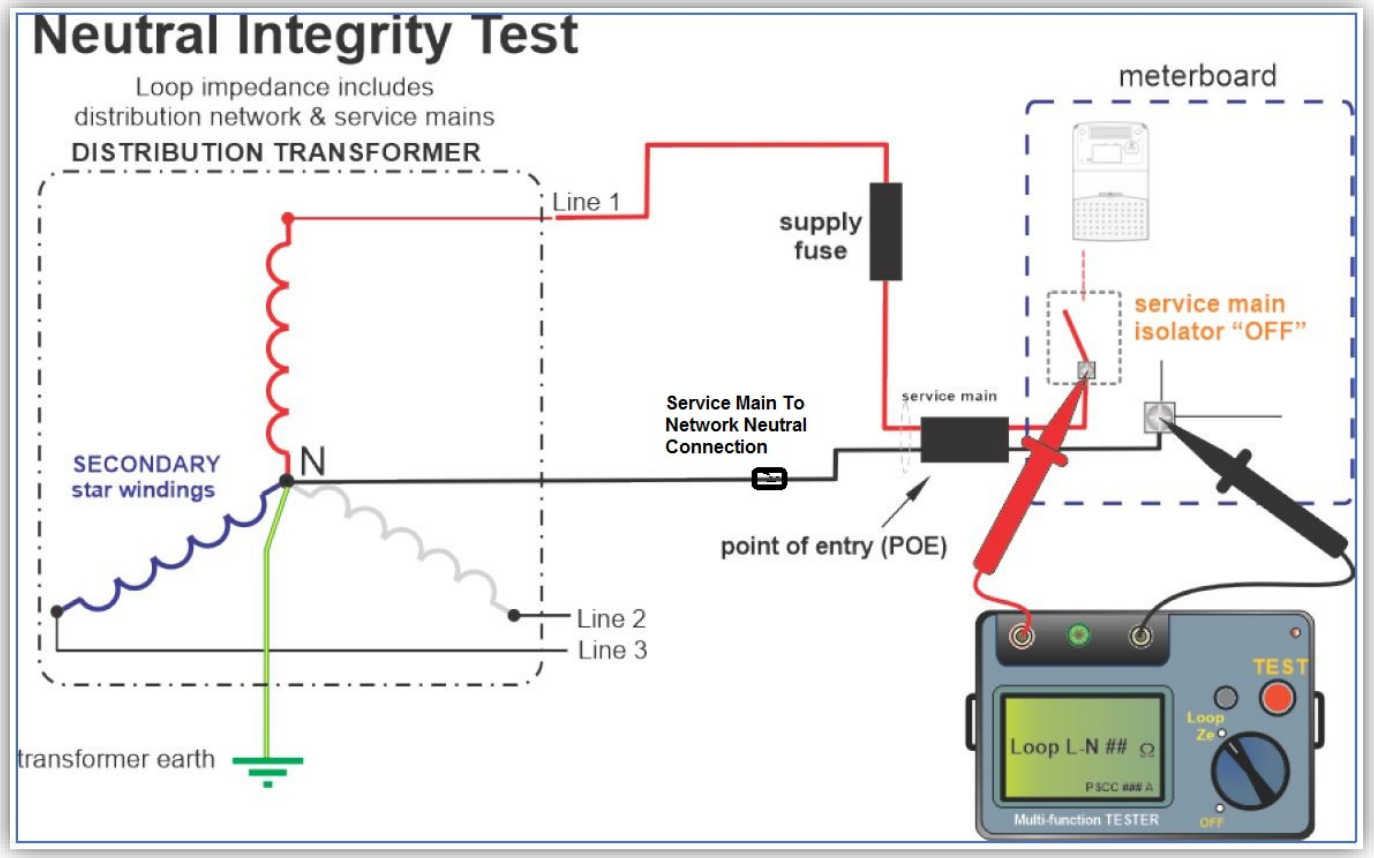


Loop Impedance Testing

Post Liven.

- Neutral loop impedance test.
- Test between live side of main isolator & main neutral terminal, Where possible.
- Sealed isolator or fixed panel meter boar may make this location impractical.
- Alternate test point could be the customer side of network neutral connection point at the pole or pillar.
- Check with Client – Close main Switch





Metering – Access To Sealed Test Points.

The main isolator may be sealed as part of the metering installation.

If it is necessary to break this seal to carry out polarity testing for an installation, the person conducting the tests must notify the metering equipment provider or electricity retailer.

Companies should have a process in place covering the steps required in the case of broken seals.

Regulations pertaining to removal or breakage of seals can be found in the Electricity Industry Participation Code 2010, Schedule 10.7 Section 48.

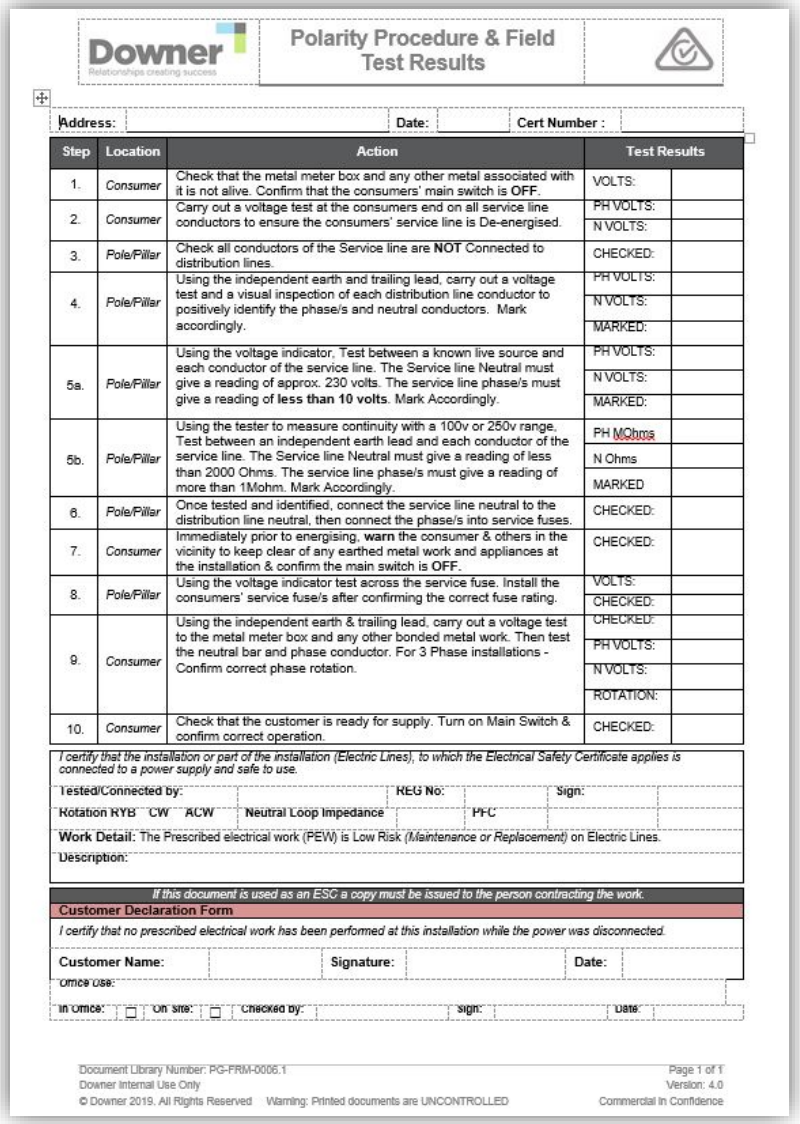
Legal Stuff

Electrical Safety Certificate (ESC)

The ESC applies to PEW on any fitting that supplies an installation or a part installation with electricity. The ESC is always the final document to be issued in the certification process.
The ESC makes the statement – *"the installation is connected to a power supply and is safe to use"*

The ESC must always:

- Be signed and dated by the person who completed the connection.
- Give the name and registration number of the person who did the connection.
- **If the persons** above where acting under supervision, then the name and registration number of the supervisor.



Downer — Polarity Procedure & Field Test Results

Address: Date: Cert Number :

Step	Location	Action	Test Results	
1.	Consumer	Check that the metal meter box and any other metal associated with it is not alive. Confirm that the consumers' main switch is **OFF**.	VOLTS:	
2.	Consumer	Carry out a voltage test at the consumers end on all service line conductors to ensure the consumers' service line is De-energised.	PH VOLTS:	
			N VOLTS:	
3.	Pole/Pillar	Check all conductors of the Service line are **NOT** Connected to distribution lines.	CHECKED:	
4.	Pole/Pillar	Using the independent earth and trailing lead, carry out a voltage test and a visual inspection of each distribution line conductor to positively identify the phase/s and neutral conductors. Mark accordingly.	PH VOLTS:	
			N VOLTS:	
			MARKED:	
5a.	Pole/Pillar	Using the voltage indicator, Test between a known live source and each conductor of the service line. The Service line Neutral must give a reading of approx. 230 volts. The service line phase/s must give a reading of **less than 10 volts**. Mark Accordingly.	PH VOLTS:	
			N VOLTS:	
			MARKED:	
5b.	Pole/Pillar	Using the tester to measure continuity with a 100v or 250v range. Test between an independent earth lead and each conductor of the service line. The Service line Neutral must give a reading of less than 2000 Ohms. The service line phase/s must give a reading of more than 1Mohm. Mark Accordingly.	PH MOhms	
			N Ohms	
			MARKED	
6.	Pole/Pillar	Once tested and identified, connect the service line neutral to the distribution line neutral, then connect the phase/s into service fuses.	CHECKED:	
7.	Consumer	Immediately prior to energising, **warn** the consumer & others in the vicinity to keep clear of any earthed metal work and appliances at the installation & confirm the main switch is **OFF**.	CHECKED:	
8.	Pole/Pillar	Using the voltage indicator test across the service fuse. Install the consumers' service fuse/s after confirming the correct fuse rating.	VOLTS:	
			CHECKED:	
9.	Consumer	Using the independent earth & trailing lead, carry out a voltage test to the metal meter box and any other bonded metal work. Then test the neutral bar and phase conductor. For 3 Phase installations - Confirm correct phase rotation.	CHECKED:	
			PH VOLTS:	
			N VOLTS:	
			ROTATION:	
10.	Consumer	Check that the customer is ready for supply. Turn on Main Switch & confirm correct operation.	CHECKED:	

I certify that the installation or part of the installation (Electric Lines), to which the Electrical Safety Certificate applies is connected to a power supply and safe to use.

Tested/Connected by: REG No: Sign:

Rotation RYB CW ACW Neutral Loop Impedance PFC

Work Detail: The Prescribed electrical work (PEW) is Low Risk *(Maintenance or Replacement)* on Electric Lines.

Description:

If this document is used as an ESC a copy must be issued to the person contracting the work.

Customer Declaration Form

I certify that no prescribed electrical work has been performed at this installation while the power was disconnected.

Customer Name: Signature: Date:

Office Use:

In Office: ☐ On Site: ☐ Checked by: Sign: Date:

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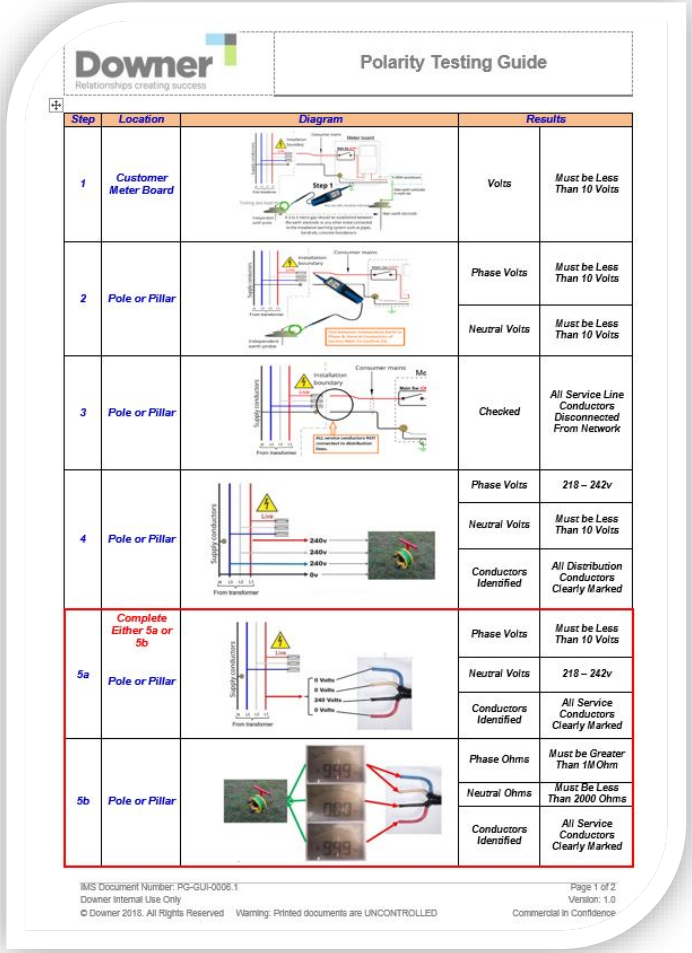
Downer Guide

Downer have developed this guide to support our field teams to successfully complete and record polarity testing.

The steps in the guide directly relate to the line items in the ESC shown in the previous page.



Downer
Relationships creating success

Polarity Testing Guide

Step	Location	Diagram	Results	
1	Customer Meter Board		Volts	Must be Less Than 10 Volts
2	Pole or Pillar		Phase Volts	Must be Less Than 10 Volts
			Neutral Volts	Must be Less Than 10 Volts
3	Pole or Pillar		Checked	All Service Line Conductors Disconnected From Network
4	Pole or Pillar		Phase Volts	218 – 242v
			Neutral Volts	Must be Less Than 10 Volts
			Conductors Identified	All Distribution Conductors Clearly Marked
5a	Complete Either 5a or 5b Pole or Pillar		Phase Volts	Must be Less Than 10 Volts
			Neutral Volts	218 – 242v
			Conductors Identified	All Service Conductors Clearly Marked
5b	Pole or Pillar		Phase Ohms	Must be Greater Than 1M Ohm
			Neutral Ohms	Must Be Less Than 2000 Ohms
			Conductors Identified	All Service Conductors Clearly Marked

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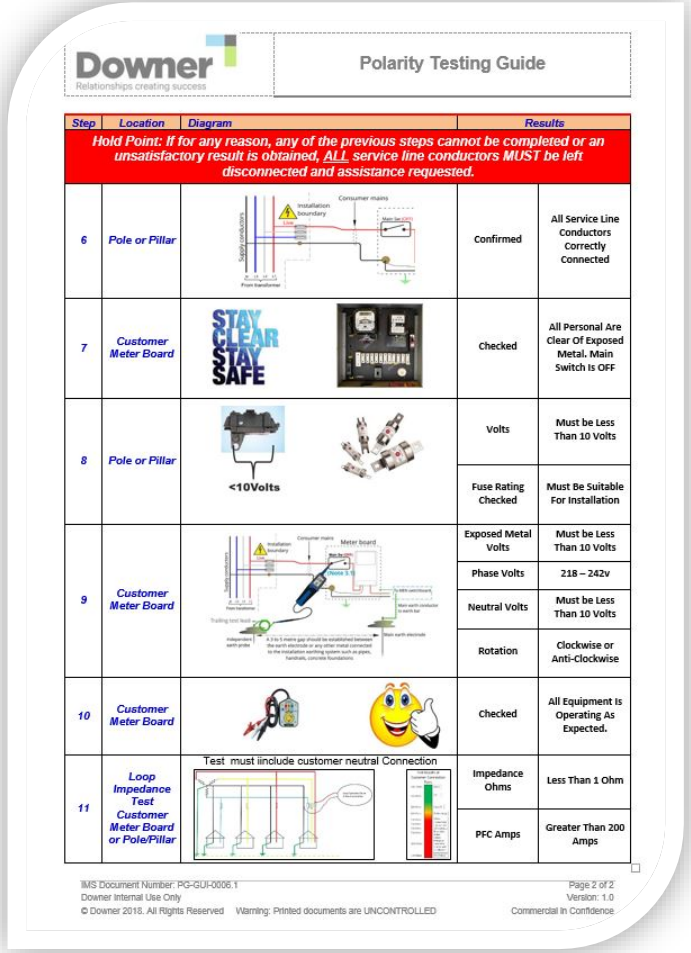

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Relationships creating success

Polarity Testing Guide

Step	Location	Diagram	Results	
Hold Point: If for any reason, any of the previous steps cannot be completed or an unsatisfactory result is obtained, ALL service line conductors MUST be left disconnected and assistance requested.				
6	Pole or Pillar		Confirmed	All Service Line Conductors Correctly Connected
7	Customer Meter Board		Checked	All Personal Are Clear Of Exposed Metal. Main Switch Is OFF
8	Pole or Pillar		Volts	Must be Less Than 10 Volts
			Fuse Rating Checked	Must Be Suitable For Installation
9	Customer Meter Board		Exposed Metal Volts	Must be Less Than 10 Volts
			Phase Volts	218 – 242v
			Neutral Volts	Must be Less Than 10 Volts
			Rotation	Clockwise or Anti-Clockwise
10	Customer Meter Board		Checked	All Equipment Is Operating As Expected.
11	Loop Impedance Test Customer Meter Board or Pole/Pillar	Test must iinclude customer neutral Connection	Impedance Ohms	Less Than 1 Ohm
			PFC Amps	Greater Than 200 Amps

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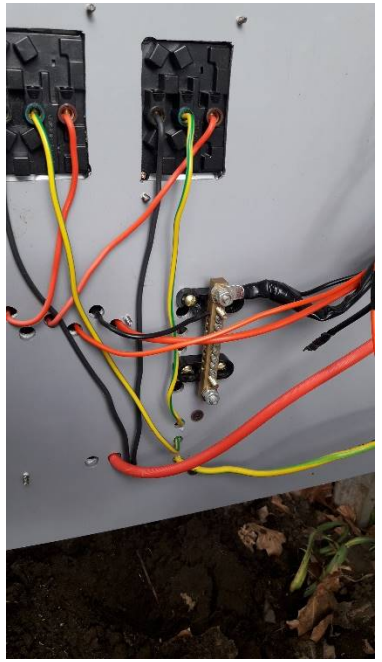
What We're Finding

Corroded, Loose or Broken Earth Wires

High Resistance Overhead Line Connections

Low Voltage Underground Running Hot



Missing Earth-Neutral Link

Questions.