VESI

Installation Supply Connection Tests & Procedures

January 2024

Contents

These procedures have been prepared for the use of Electrical Distribution companies within the State of Victoria and endorsed by the following Distributors:

CITIPOWER Jemena Powercor AUSTRALIA AusNet united energy

www.vesi.com.au

Information contained within this section shall be read in conjunction with all sections of this Installation Supply Connection Tests & Procedures manual.

GENERAL

1.1 Changes Summary

Date	Summary of Changes	Section
January 2024	Removed pre 2024 manual version “Summary of Changes” from new manual.	1.1
	Updated definition for disturbed neutral. New Definition "Connection Worker". Replaced definition for POEL with PAL.	1.2
	Updated membership and chair of the committee.	1.3
	Added note to header referring VESI Memo 09/05/2018 recommending equipment to be to Cat rated by July 2023. Added note to header referring to equipment shown is indicative only as each DB may have an approved list. Added additional NST units as per VESI memo January 2020. Additional testing equipment added to reflect updated models of audible testers and insulated contact phase sequence testers.	2.3
	Additional pictures added of independent Earth and trailing leads.	2.4
	Meter programmer removed as no longer in use.	2.6
	Old section 2.7 Neutral tags and section 2.8 labels now 2.6 and 2.7	2.7 & 2.8
	Removed picture of UE defect label, as no longer in use. Was 2.8	2.7
	Note updated to “NITP testing involving the FOLCB shall only be undertaken **with** the FOLCB completely isolated: Replaced “when” to “with”.	3.3
	Updated the IR value for existing installation from 5 to 1 Megohm as per VSIR. New table added for minimum IR value for new cable	3.4
	Simplified wording in step 1 for better clarity. Updated voltage for testing outcome, to reflect now nominal voltage 230, 400/460	3.5
	Added note for remote metering without a switchboard and qualification required for this arrangement.	4.5
	Step 7 reworded to "Visually check MEN terminal block, earth stud and earth rod connections are completed. " Added new step 8 "Test continuity between the MEN terminal block and column to ensure less than 0.5 Ω resistance" Old step 18 removed.	4.9
	Moved existing section 4.10 Public Lighting – Without Switchboard to this new section. Removed asterix from diagram for step 8. Step 8 added IR value for light head connected or disconnected due to possible damage to LED light head when testing.	4.9.1
	New procedure for street light column with customer metered supply. This section is informative only.	4.10
	Added a note for Step 2 ‘remove service fuse/s’ for additional precautions are required under shutdown conditions where the fuse has not been removed prior to disconnecting the service and dropping the service to the ground.	4.11
	The header for alternative NITP has changed to reflect it is a “method for establishing an alternative NITP”, as feedback was people consider that this was the only test required and not completed all of the testing steps as per the procedure.	4.11
	Section 4.11A, 4.11B and 4.11C have been renumbered to 4.11.1, 4.11.2 and 4.11.3 respectively.	

Date	Summary of Changes	Section
January 2024 (cont.)	New step 15, ensure consumer's mains are accessible in pit and separated in preparation for consumer main test. Additional note added for step 16. IR test required when customers mains are disconnected from the DB's pole i.e., pole replacement work. IR test is not mandatory where pole to pit has been disconnected. IR value for existing installation changed from 5 to 1 megohm. Meg Ohm changed to **megohm** as per spelling in ES(G)R 2019	4.11.1
	IR value for existing installation changed from 5 to 1 megohm as per VSIR. Meg Ohm changed to megohm as per spelling in ES(G)R 2019	4.11.2 & 4.11.3
	Section 4.14A and 4.14B have been renumbered to 4.14.1 and 4.14.2 respectively.	
	Reformatted heading to align with other procedures layout.	4.14.1
	Section 5 renumbered due to removal of old section 5.1 table of contents.	5
	Updated M1120 NST screen display to include V1 & V2 models.	5.1.2
	New section for Digital Supply Connection Tester Starlogixs SCT16(415) Screen Display.	5.1.3
	New section for Digital Supply Connection/ Loop Impedance Tester SLIM SL5215 Screen Display.	5.1.4
	Replaced Other Sources with Supplementary in title. Updated labelling for embedded generators. Removed the mandatory requirement to lock main switch for alternative supply to secure in the off position.	5.3
	Updated Orders in Council to reflect new G51 was published in December 2020 and G17, G33 & G36 have now being revoked.	5.4
	Updated ESV safety alert.	5.5

1.2 Definitions

The definitions provided in this document, "Installation Supply Connection Tests and Procedures," are applicable to this document and may vary from definitions found in other documents.

Alive/Live – means energised or subject to hazardous induced or capacitive voltages.

Approved – means having appropriate organisation's endorsement in writing for a specified function.

Authorised – A person with the technical knowledge or sufficient experience who has been approved or has the delegated authority to act on behalf of an organisation to perform the duty concerned.

Competent – Having the skills, knowledge and attributes a person needs to complete the task.

Conductor – means a metal wire or a combination of wires, typically copper or aluminum, forming the core component of a cable, and is designed for carrying electricity.

Connection Worker – Is a Licensed Electrical Worker (Line Worker, Cable Jointer, Electrical Inspector and Metering Technician) who is required to carry out servicing and connection testing procedures on a VESI distribution network, and has completed the required initial training in "Testing of connections to low voltage electricity networks UETDRMP011" (refer to current training standards published at VESI Skills & Training and has attended annual refresher training, to maintain their annual currency assessment.

Consumer Mains – means the conductors installed between the point of supply/consumer terminals and the main switchboard.

Consumer's Terminals – means the electrical junction at which the Distributor cable or supply conductors connects to the customers installation or consumer's mains within the customer's property.

Customer – means a person or organisation whose electrical installation is connected to the Distributor's distribution system or who may want to have its electrical installation connected to the Distributor's distribution system

CT – means current transformer

De-energised – means not connected to any source of electrical supply, but not necessarily isolated.

Distributor – means a person who holds a Distribution Licence, or who is exempted from holding a licence of the Electricity Industry Act.

- A "Distributor" is also known as the Local Network Service Provider (LNSP).
- A "relevant Distributor" is the Distributor who operates the Network in the area associated with electrical installation.

Disturbed Neutral – means a physical and/or electrical break from the incoming and/or outgoing mains neutral conductor, neutral conductor terminals or electrical connections, or when a direct physical force has been applied on the incoming and/or outgoing mains neutral conductor terminations or connections.

Examples of when a neutral connection is considered to be "disturbed" include:

- When the neutral conductor is disconnected or reconnected; or
- When there is possible change in electrical resistance of the neutral connection and/or termination; or
- When the neutral connection has been loosened and slid along the conductor; or
- When a neutral conductor has been connected in parallel and then the original neutral conductor removed; or
- Where the LV service cable neutral connection has had a direct physical force applied to it. For example: An O/H LV service cable that has been suspended/supported by the electrical connections.

These examples demonstrate situations that can lead to a disturbed neutral condition, highlighting the importance of vigilance and thoughtful consideration by Lineworkers regarding their actions. It's crucial to note that there could be other instances where the neutral is disturbed, however these examples provide a clearer understanding of the concept. Connection workers should always be mindful of their responsibility to ensure the safety of the electrical installation including the integrity of the neutral.

> **Note:** This definition does not apply to network mains. Refer to network procedure.

Electrical Installation – means consumer terminals, their enclosure, and all wiring and equipment downstream and supplied from those terminals, except for the Distributor's network assets and where applicable, the metering assets.

An electrical installation does not include Distributors network assets including:

- Meter equipment located within an electrical installation, including the service and distribution equipment upstream of the consumer terminals.
- Network assets on land occupied by a Distributor that is not used for the consumption of electricity on that land or incidental to that consumption.
- Fuse cartridges for a Service Protection Device and/or Occupancy Disconnection Device.

FOLCB – means Fused Overhead Line Connection Box.

FSD – means Fused Switch Disconnector eg a "Krone" box

High Voltage or 'HV' – means High Voltage which is a nominal voltage exceeding 1000V AC or exceeding 1500V DC.

Isolated – means not connected to any possible sources of electricity supply by means which will prevent unintentional re –energisation of electrical apparatus and which is assessed as a suitable step in the process of making safe for access purposes.

LEW – means Licensed Electrical Worker, a general term for the following licence classes:

- *Licensed Lineworker* – means a person holding an Electrical Lineworker's Licence, (D, C Class)
- *Licensed Electrician* - means a person holding an Electrician's Licence, (A Grade).
- *Licensed Electrical Inspector* - means a person holding an Electrical Inspector's Licence, (G Class).

Low Voltage or 'LV' – means Low voltage which is a nominal voltage exceeding 50V AC/120V DC but not exceeding 1000V AC. or 1500V DC.

MEN – means multiple earthed neutral, an earthing system where the LV neutral conductor is permanently connected to earth at the distribution substation, the customer premises and any other point throughout the neutral system as required.

NITP – means Neutral Integrity Test Point being a point on the installations earth system proven to be connected the installations neutral system in accordance with these procedures.

Occupancy – means an electrical installation or part thereof, which is supplied with electricity through a specific meter or meters and for which an individual electricity consumption account is rendered.

Occupancies Multiple or Multiple Occupancies – means more than one Occupancy connected to the same electrical installation.

Private Electric Line – any electric line that conducts electricity within an electrical installation from the Point of Supply.

Private Aerial Lines (PAL) – PAL are low voltage poles and wires (which can be bare or insulated), generally located on private properties which form part of the electrical installation (of the property) and carry the electricity supply from the electricity distribution network. These have been historically known as Private Overhead Electric Lines (POELs), and even referred to as Aerial Consumers Mains (ACM).

POA – means the Point Of Attachment at which an overhead aerial service cable is attached to the structure containing the electrical installation.

POS – means the Point of Supply at which the electricity Distributors service cable or supply main connects to the consumer terminals.

REC – means Registered Electrical Contractor.

Responsible Officer – means the officer appointed by the relevant Distributor to be responsible for the administration of these Rules. Dependent on a Distributor's structure, there may be multiple Responsible Officers with specific responsibilities, eg, negotiation for supply, provision of substations, specification of points of supply, types of supply, servicing and metering etc.

Service Cable / Line – the final span or section of a Distributor's low voltage aerial or underground network asset that is connected to the consumer terminals.

Service Equipment – means equipment owned by the Distributor and used to connect supply to an Electrical Installation.

SCCD – means Supply Capacity Control Device – a customer provided circuit breaker requested by the Distributor to limit the installation load on the network.

SDD – means Supply Disconnection Device - a supply disconnection and reconnection device as required by Service & Installation Rules.

> **Note:** The most recent version of the SIRs now refers to an ODD (Occupancy Disconnection Device)

SPD – means Service Protection Device – a device required by the Electricity Safety Act and Service Protection clause of the Service & Installation Rules.

> **Note:** The most recent version of the VSIRs now refers to a SPD as a Supply Protection Device

Shall – is to be interpreted as "mandatory".

Should – is to be interpreted as "advisory or discretionary"

Supply Connection Facility – means a facility containing consumer terminals, eg, pillar, cubicle, switchboard or CT enclosure.

Underground Reticulated Distribution (URD) – is defined as an underground cable network used in areas where no electrical protective device is provided at the origin of the individual service cable.

Un-metered Supply – means a supply that is not metered

1.3 Administration

These Installation Supply Connection Tests and Procedures are administered by a committee comprising of nominated representatives from Victorian Electricity Distributors, AusNet Services, CitiPower Pty, Jemena Electricity Networks, Powercor Australia Pty Ltd, United Energy and industry stakeholders.

This committee have accepted the tests and procedures contained in this document following their development by the committee, and endorsement from their respective companies and as such issue the tests and procedures as a Victorian Electricity Supply Industry (VESI) document.

The tests and procedures are reviewed on a regular basis. Revisions and additional tests and procedures may be included in this document from time to time and it is therefore important the user ensures they are utilising the current document.

Members of the VESI Installation Connection Tests and Procedures Committee at this time are: Tony Martucci (United Energy), John Vasilopoulos (Jemena), Peter Mobbs (Chair, AusNet Services), Anwar Qayyum and Chris Drake (Powercor), Brad Turner (Zinfra), Jason Angel (Downer), Peter Allan (Citipower), Grant Roe (ETD) Brent Matthews and Robert Oldfield (ESV).

1.4 Distribution

Revised copies of these tests and procedures are distributed from time to time so it is important the user ensures they are utilising the current document.

Each electricity Distributor's nominated representative serving on the VESI Installation Connection Tests and Procedures Committee is responsible to ensure arrangements are in place within their respective companies to ensure authorised users are aware of the latest documents.

1.5 Scope

These tests and procedures are to be used by persons authorised by the above companies for the connection of all customer installations, occupancies, and/or network assets as described in this document.

The tests and procedures:

- apply from the connection point of the installation to the network and/or occupancy to its connection point and include the service cable supplying the connection point where this is applicable.
- do not apply to the low voltage reticulation electricity network upstream of the service connection to that network.
- are the accepted tests and procedures referred to in the VESI Field Workers Handbook.

1.6 Objectives

The objective of these tests and procedures is to ensure the safe connection to the electricity supply networks by proving the correct supply connection to each main switchboard, occupancy switchboard or equipment to be supplied. This objective is achieved by ensuring the supply connection has the correct:

- polarity
- phase sequence;
- connection and continuity of the neutral conductor;
- connection and operation of the metering equipment

1.7 Tests

To prove the correct supply connection it is necessary to perform the applicable tests and procedures detailed in this document at the appropriate stages where work is performed, ie:

- Test for de-energised
- Neutral Integrity Test Point (NITP) - Test
- Underground Consumer Mains Test
- Polarity Test
- Check Test
- Neutral & Supply Test (NST)
- Meter Load Test
- Phase Sequence Test

1.8 Innovation

Alternate testing equipment and/or tests and procedures are not precluded, provided they are approved by the relevant electricity Distributor and achieve equal or better outcomes.

1.9 Authorisation

Persons performing Test & Connection procedures on behalf of a Network Operator are approved when appropriately trained and assessed as competent in the application of the tests and procedures in accordance with the VESI Skills and Training Guideline and the Electricity Safety Act.

1.10 Non - Compliant Test Results

Where acceptable results are not attained in accordance with these tests and procedures during their application, the work site shall be maintained in a safe condition in accordance with distributor's procedures and:

- Where the worker has the competency and authorisation to identify and rectify the cause of the deficient test result they shall do so.
- Where the worker does not have the competency and authorisation to identify and rectify the cause of the deficient test result, they shall report the matter to their supervisor and ensure affected persons are advised.

1.11 Disclaimer

These Tests & Procedures have been published by CitiPower, Jemena Electricity Networks; Powercor Australia, AusNet Services and United Energy. The document has been compiled using drawings, guidelines and information that comply with the relevant acts and regulations of the State of Victoria at the date of publication.

It is the responsibility of the end user to determine the suitability of material contained herein to the particular application or purpose of which it is used. Electricity supply publications are revised when necessary by the issue of either revised pages or complete new editions. It is important that users of such publications ascertain they are in possession of the latest issue.

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1.12 Copyright

Information contained within this section shall be read in conjunction with all sections of this Installation Supply Connection Tests & Procedures manual.

TESTERS & EQUIPMENT

2.1 Introduction

Section 2 of this manual is to reflect some of the testing equipment used on the networks.

The testers and equipment shown (except NST units) are indicative only, as each DB may have an approved list. It is the responsibility of the delivery partner/contractor working on the different networks to ensure they are using approved equipment on the relevant network.

A reminder as per VESI Memo dated 09/05/2018, the recommendation for all testing equipment used for VESI testing of connections to meet Cat III 1000V or Cat IV 600V by July 2023.

2.2 Test Equipment Maintenance

2.2.1 General

Care shall be taken in maintaining test equipment in a suitable manner. Equipment shall not be exposed to impact, solvents, excessive moisture, ultraviolet radiation or placed in any other environment that may effect the equipment performance.

The condition of leads, test and connection equipment shall be visually checked to ensure they are in a serviceable condition prior to use.

Testers and indicators should be tested for correct operation before and after use

2.2.2 Calibration

Calibration and testing requirements are listed against each tester.

Calibration of testers shall be performed by a National Association of Testing Authorities (NATA) or to a criteria approved by the electricity Distributor.

2.3 Testers

The testers and equipment shown (except NST units) are indicative only, as each DB may have an approved list.

As per VESI Memo dated 09/05/2018 recommendation for all testing equipment used for VESI testing of connections to meet Cat III 1000V or Cat IV 600V by July 2023.

2.3.1 Voltage Indicators

Neon Type Testers

Audible Testers

Ezyvolt Tester

EFO VT2

Application

Testing for De-energised, Polarity Testing & Check Testing

General

Voltage Indicators provide an indication of the approximate voltage and may be used in conjunction with an independent earth or as an individual unit depending upon the application.

Test the voltage indicator operation prior to and immediately after testing.

To test the operation of a voltage indicator and testing circuit:

- Test to a known live 230V source.
- Conduct continuity test using:
  - Self test function on Audible Voltage Indicators

Maintenance

Tester operation is to be proven prior to and after testing.

2.3.2 Neutral & Supply Testers

The NST units shown are currently the only accepted units on the VESI network

Dewar M1110

Application

Neutral & Supply Testing

General

The Neutral & Supply Tester performs an impedance test of the supply active and supply neutral.

The tester demonstrates by indicators:

- Power on
- High reference earth resistance
- Voltage outside acceptable test range
- High neutral and/or active impedance
- Audible fault alarm
- Safe for use

The faults detected are:

- Independent earth has high resistance
- Active to neutral voltage out of tolerance
- High earth to neutral voltage
- High resistance in active and neutral supply circuit

Results of the self check functions and test results are indicated by combinations of the instrument indicators. (refer Appendix 1).

Blue label models of the NST have a "*Touch to Test*" pad for manual operation of the Neutral impedance test when the indicating light "*ready/pass*" is flashing.

Yellow label models of the NST have a modified or removed "*Touch to Test*" pad for automatic operation of the Neutral Impedance test.

M1120 V1 and V2

NST M1120 V1 and V2 Electronic Models

Provides the test functions as listed above with supporting digital readout of actual test results (refer Appendix 1)

Refer to specific instrument details and instructions

Maintenance

Individual Distributors are to ensure the maintenance of accuracy and sound condition of the equipment including leads and probes.

Slim 2000 SL5215

Starlogixs SCT16(415)

Other NST Electronic Models

Provides the test functions as listed above with supporting digital readout of actual test results (refer Appendix 1)

Refer to specific instrument details and instructions

Maintenance

Individual Distributors are to ensure the maintenance of accuracy and sound condition of the equipment including leads and probes.

2.3.3 Insulation Resistance and Continuity Tester

Megger IR tester

Applications

Underground Consumers Mains Testing & Neutral Integrity Test Point - Testing.

General

Insulation Resistance and Continuity Testers are used for testing insulation resistance of cables and continuity of conductors.

Test the instrument operation prior to and immediately after testing.

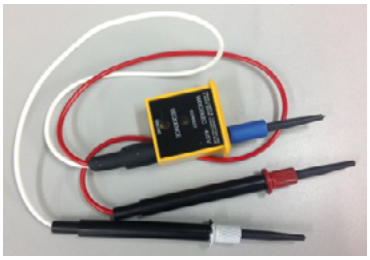
To test the operation of instrument and leads test as follows:

- Leads apart = Open Circuit
- Leads together = Zero Ohms

Maintenance

- Calibration test at intervals not to exceed twelve months.
- Periodic replacement of internal batteries where required.

2.3.4 Phase Sequence Tester



Application

Phase Sequence Testing.

General

Phase Sequence Testers are used to establish the phase sequence at various supply locations.

The tester is self-checking during phase sequence testing.

NOTE: The Eazyvolt tester is an approved Phase Sequence tester

There are bare contact and insulated contact models available

Maintenance

General care.

2.3.5 Load Tester

Application

Load Testing

General

Load testers are applied between the neutral and the load side active/s terminal/s of direct metering equipment to verify that the metering equipment is registering the consumption of energy.

Maintenance

General care.

Note: Hair dryer type testers have potential to disturb dust and debris that may be present in proximity of test location e.g., meter boxes.

Non air dispersion models are available to avoid disturbing the dust.

2.4 Test Equipment

Test Equipment shown below is typical of the Test Equipment used. Other equipment maybe used provided it is approved for use by the individual Distributor/Network Operator.

2.4.1 Independent Earth

Applications

Testing for De-energised, Polarity Testing, Check Testing and Neutral & Supply Testing

General

An independent earth is utilised in a number of test procedures.

The independent earth spike is pushed into the ground at least two (2) metres away from any installation earths, water pipes and conductive structures.

For paved areas where the spike cannot be pushed into the ground, have the spike held in firm contact with the paving.

Testing of the independent earth is performed in conjunction with the test equipment.

Maintenance

General care.

2.4.2 Trailing Leads

Application

Neutral Integrity Test Point - Testing.
NST testing at Neutral Integrity Test Point locations.

General Information

Trailing leads are used in test procedures where there is a need to extend the testing circuit.
Testing of the trailing leads is performed in conjunction with the test equipment.

Maintenance

General care.

2.5 Connection Equipment

2.5.1 Low Voltage Stick and Fuse Extractor

Application

For the extraction/insertion of stick operated Low voltage Service Fuse wedges up to 100amp.

Maintenance

General care.

2.5.2 Pit Protector

Application

All underground activity where the pit is exposed and unattended.

General Information

Hazard Signs or barriers are used to provide a safety warning to the public or other workers of a road opening or pit hazard.

2.5.3 Installation Under Test Notice

Application

Metering positions and Customers Main Switchboard

General Information

Installation Under Test Notices are used to provide a safety warning to the public and other workers. The notices may also be used at locations other than the above mentioned when required, e.g., underground pits/pillars

2.6 Neutral Tags

2.6.1 Identification and marking of LV Neutral conductors

Application

Distribution Mains Neutral Conductors

Shall be identified and marked in accordance with the responsible Distributors standards, policies and works practices.

2.6.1 Identification and marking of LV Neutral conductors

Service Cables

Overhead and underground service cable neutral conductors must be identified by visual examination and testing, and marked by means of a neutral tag fitted adjacent to the origin and load end terminations of the conductors, or other means acceptable to the responsible Distributor .

Underground Consumer Mains

Underground consumer mains neutral conductors must be identified by visual examination and testing and marked adjacent to the point of supply termination by means of a neutral tag, except where they are terminated in a FOLCB or Circuit Breaker.

All Consumer Mains

Due to electricity safety regulation requirements, Distributor test procedures and standards relating to the identification of installations un-metered and metered consumer mains neutral conductors by colour, termination position and testing; the marking by connection workers is not required unless there is a risk of mistaken identification and connection.

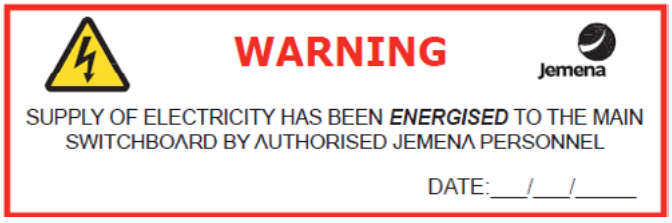
Where a risk of mistaken identification and connection may exist, e.g., aging and discoloured VIR and/or TRS conductors, or neutral continuity relying on meter connections, the installations consumer mains neutral conductors must be identified by visual identification and testing and marked adjacent the terminations being worked on.

Marking may be by a small or modified neutral tag or black insulation tape applied to form a permanent layer around the conductor at the cable/s termination.

2.7 Labels

The labels displayed are examples used by various Distributors in accordance with their relevant procedures.

2.7.1 Caution Supply Connected



Typical Application

Usually larger or complex installations to indicate that an installation or equipment has been energised.

2.7.2 Defect on Issue

CitiPower/Powercor

Typical Application

Used to notify customers and other industry workers of a defect at an installation.

2.7.3 Warning Label

Typical Application

Used on meter panels and meters to deter interference to seals and metering equipment.

Information contained within this section shall be read in conjunction with all sections of this Installation Supply Connection Tests & Procedures manual.

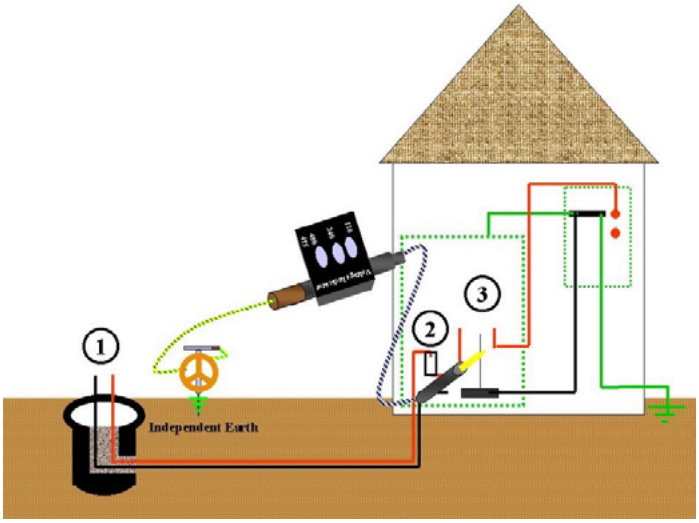
TEST PROCEDURES

3.1 Non-Compliant Test Results

Where acceptable results are not attained in accordance with these tests and procedures during their application, the work site shall be maintained in a safe condition in accordance with distributor's procedures; and

- Where the worker has the competency and authorisation to identify and rectify the cause of the deficient test result they shall do so.
- Where the worker does not have the competency and authorisation to identify and rectify the cause of the deficient test result, they shall report the matter to their supervisor and ensure affected persons are advised.

3.2 Test for De-Energised

Purpose	To prove that apparatus to be worked upon is de-energised prior to the commencement of work on the apparatus.
Equipment Required	Voltage Indicator Independent Earth
Method	1. Install independent earth, connect voltage indicator to independent earth: (*at least **2m** from from any installation earths, water pipes and conductive structures.* 2. Test voltage indicator and circuit. 3. Test all apparatus to be verified as de-energised with voltage indicator. 4. Test the testing circuit and voltage indicator.
Typical locations for testing for de-energised.	 1. Underground consumer's mains at a pit, pillar etc. 2. Service fuses at a meter position or FOLCB (overhead supply) 3. Metal metering enclosures and metering conductors
Notes	When performing works on existing installations test conductive components of the installation, e.g., spouting, conductive roofs, raiser brackets, metal metering enclosures within the immediate work area. For metering work ensure all adjacent exposed metalwork and exposed metal meter fixing screws are tested for de-energised. Where there is reasonable cause to believe alternative supply may exist, also test between all conductors. For additional information on Alternative Supplies see **Section 5 - Appendices**

3.3 Neutral Integrity Test Point (NITP) – Test

Purpose	To establish a valid test point for the purpose of (Polarity) Check Testing and NST testing by ensuring continuity of the consumer mains neutral conductor and the electrical installation earthing system via the MEN connection to the NITP
Equipment Required	• Insulation Resistance and Continuity Tester • Trailing Lead, where required

3.3.1 Neutral Integrity Test Points

3.3.1.1 Single Occupancy

Acceptable test points are;

1. MEN bar Customers Main Switchboard
2. Metal Metering Enclosure
3. Installation Earth Electrode/System

Note: Older installations may have used the water reticulation pipes as part of their earthing system

(*Acceptable test points are shown numerically in diagrams below*)

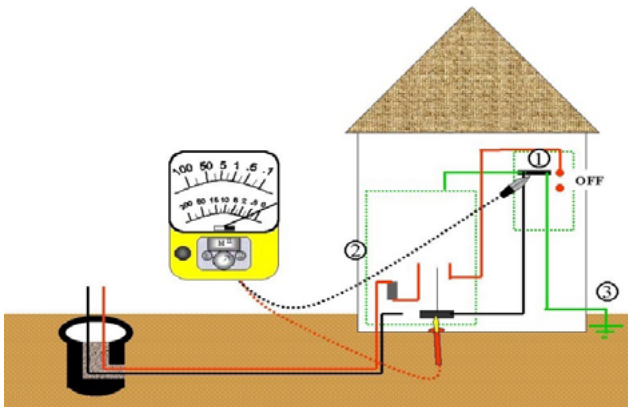
Where acceptable NITPs are not accessible, alternative NITPs will be specifically nominated in the relevant connection procedure.

Method	1. Identify acceptable Neutral Integrity Test Point; 2. Select the Ohm scale and prove the tester operation; 3. Test between consumer's mains neutral and the selected Neutral Integrity Test Point; and 4. Prove the tester operation.
Results	Resistance of **0.5 ohm** or less

Typical & Acceptable Neutral Integrity Test Points

Underground Supply

Neutral Integrity Test Point test is conducted from the Meter board Neutral link to identified acceptable NITP

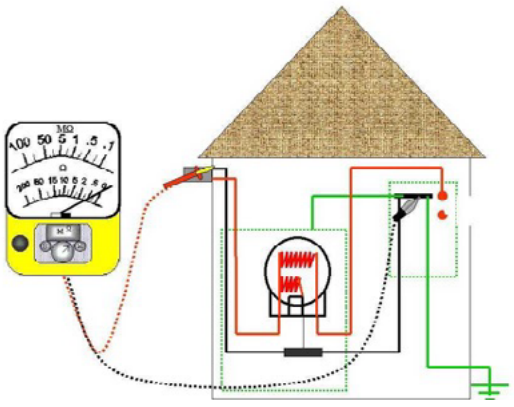


Overhead Servicing - New/ Replacement

Trailing Lead Method

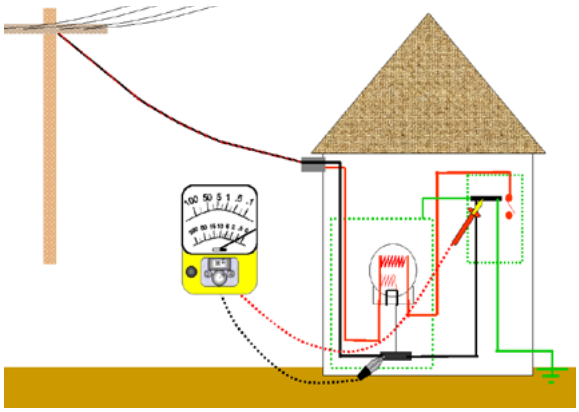
Neutral Integrity Test Point test is conducted from the consumer's mains neutral in the FOLCB to the identified acceptable NITP

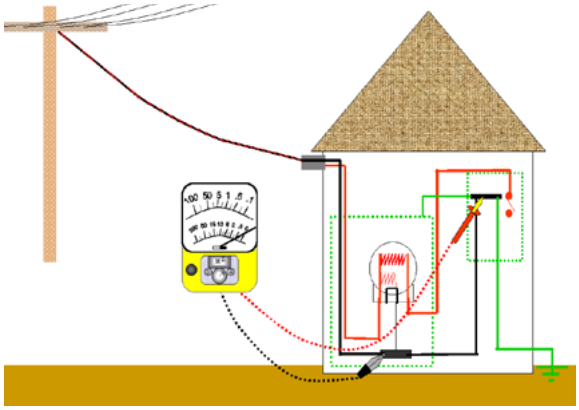
NOTE: NITP testing involving the FOLCB shall only be undertaken with the FOLCB completely isolated.



Direct Metering Alteration and/ or Addition - Single Occupancy

NITP test is conducted from the incoming neutral at the meter position to the identified acceptable NITP on the occupancy.





3.3.1.2 Multiple Occupancies

These tests & procedures for establishing a valid test point at a multiple occupancy installation will cover the majority of multiple occupancy configurations. Where these procedures cannot be applied, refer to individual Distribution company procedures.

3.1.2.1 *New Installation*

Test points for new installations are:

- MEN bar at the main switchboard;
- Neutral bar at individual group metering positions;
- Any point proven to be connected to the above points; and
- MEN bar/ Neutral bar at the occupancy switchboard.

Refer to 4.8 for Test & Connection procedure.

3.1.2.2 *Overhead service replacement – Multiple Occupancy*

Establishment of NITP is the same as for single occupancy.

Refer to Test and Connection procedure 4.11, 4.12 or 4.13 as applicable.

3.1.2.3 *Underground Service repair/replacement – Multiple Occupancy*

The MEN link or MEN bar or any point proven to be connected to these points.

3.1.2.4 *Direct Metering Alteration and/or Addition – Multiple Occupancy*

<table>
<tr><th colspan="2">Exiting Installation</th></tr>
<tr><td colspan="2">Acceptable test points for work on existing Multiple Occupancies where the main or occupancy neutral is either Not Disturbed or Disturbed:</td></tr>
<tr><th>Neutral Not Disturbed</th><th>Neutral Disturbed</th></tr>
<tr><td>• Visually confirmed point where the main earth and main neutral are connected (MEN), or
• The neutral bar/ link of a meter position that is remote to the location of the MEN.

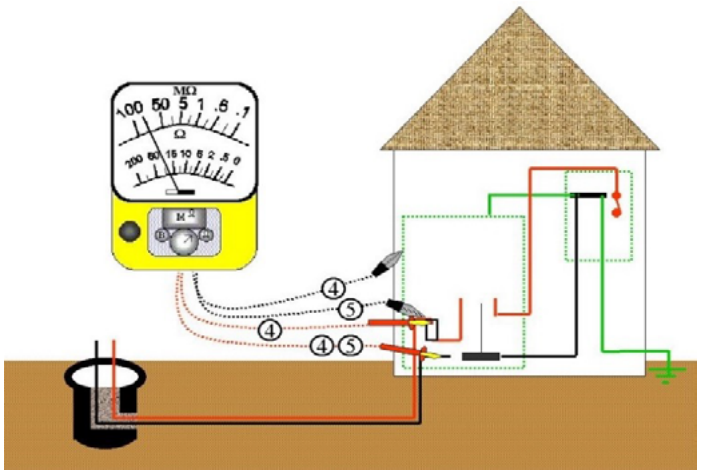
N.B. The location of the point where the main neutral and main earth are connected will be at the main switchboard or neutral link on the meter panel.</td><td>• Neutral bar at the occupancy switchboard, or
• MEN bar at the occupancy switchboard
(Only where an independent earth can be established - Appendices 5.2 not applicable)</td></tr>
<tr><td colspan="2">Further clarification on NITP location and methods to establish the valid NITP on particular types of Multiple Occupancies may be found in the following individual connection procedures:</td></tr>
<tr><td>4.14.1</td><td>4.14.2</td></tr>
<tr><td colspan="2">NOTE: If an Independent earth is unavailable, refer to Appendices 5.2 of these Procedures</td></tr>
</table>

3.4 Underground Consumers Mains Test

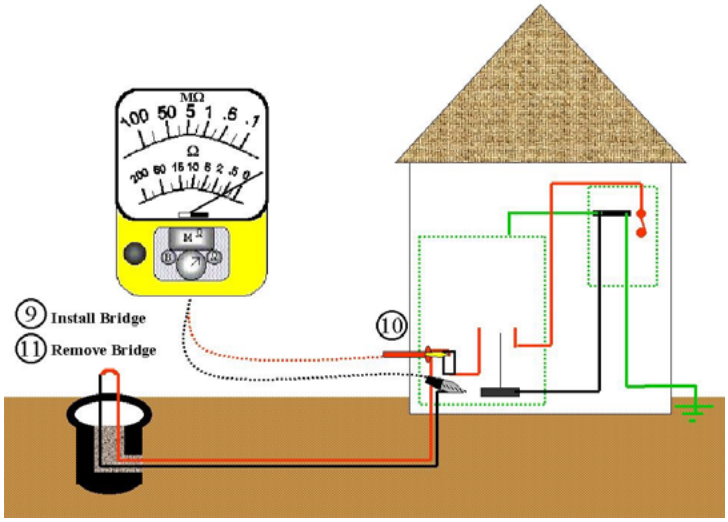
Purpose	The purpose of testing underground consumers mains is to prove: • The insulation resistance between conductors. • The insulation resistance between conductors to earth. • The continuity of the mains cables.
Equipment Required	• Insulation Resistance and Continuity Tester. • Bridging lead
Method	1. Install independent earth, connect voltage indicator to independent earth: (*at 1. Establish Earth Reference (refer Note).* 2. Ensure consumer mains conductors are separated from each other and any other conductive material. 3. Select the 500V megohms scale on the tester prove the tester operation. 4. Test each consumer's mains conductor to the established Earth Reference. 5. Test between all consumers' mains conductors. 6. Discharge conductors 7. Prove the tester operation. 8. Select the Ohm scale and prove the tester operation 9. Bridge one end of the consumer's mains neutral conductor and active conductor. 10. Test continuity of consumer's mains. 11. Disconnect bridge and re-test 12. Repeat test on each active conductor. 13. Prove the tester operation. **Note: Earth reference** – Installation earth electrode, proven point connected to installation earth electrode or independent earth.

Results	**New Consumer's Mains**	
	Conductor Length	***Result***
	Insulation Resistance	
	Up to 50m	Not less than **50 megohm**
	Greater than 50m	**5 megohm** reduction for each 25m over 50m
	Must not be less than 5 megohm regardless of length.	
	Continuity Test/s	
	Conductors Bridged	Less than **0.5 ohm**
	Bridge Removed	Open Circuit
	Existing Consumer's Mains	
	For reconnection of existing mains or repaired mains, the IR test result shall be a minimum of **1 megohm**. Where this value cannot be obtained, refer to individual Distributor Procedures.	

Typical Insulation Resistance Testing steps



4. Test each consumer's mains conductor to the established Earth Reference.
5. Test between all consumer's mains conductors.

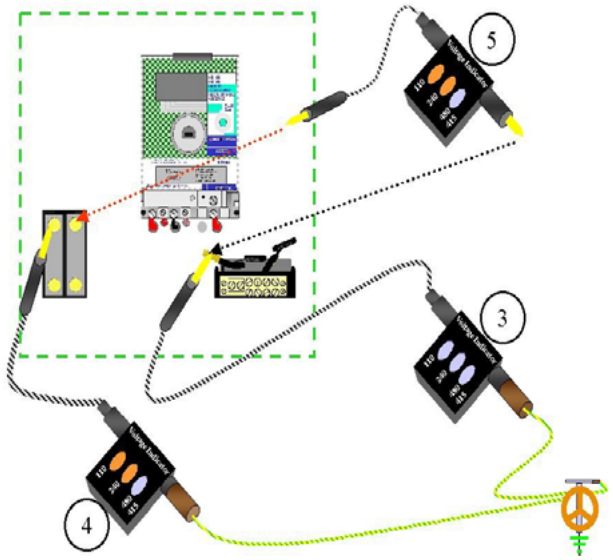
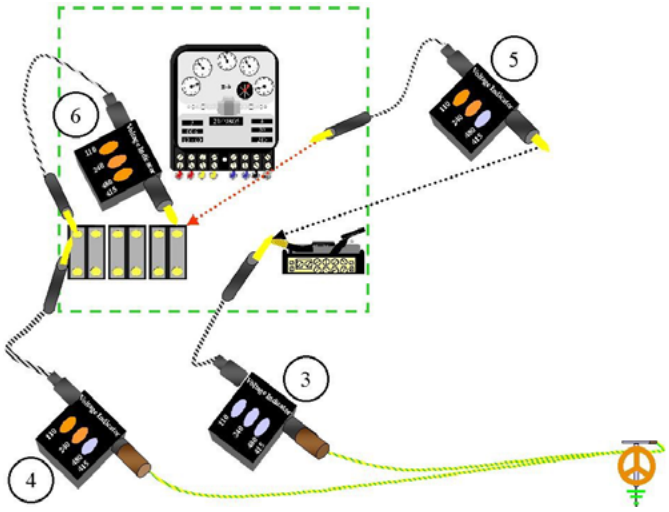


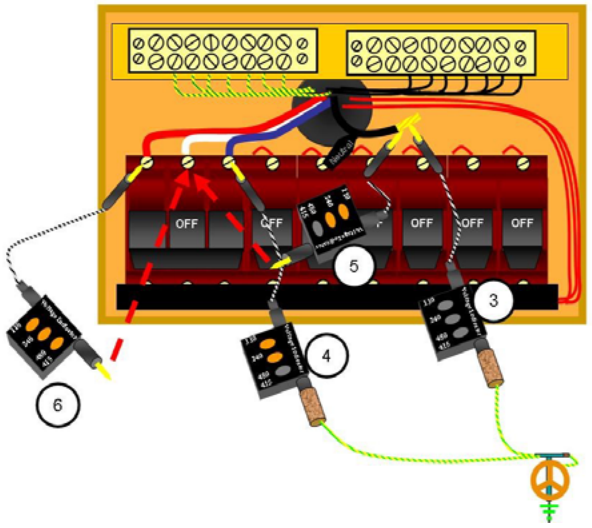
9. Bridge one end of the consumer's mains neutral conductor and active conductor.
10. Test continuity of consumer's mains.
11. Disconnect bridge and re-test

NEW CONSUMER'S MAINS - CABLE LENGTH	MINIMUM RESISTANCE VALUE
≤ 50m	50 megohms
> 50 m and ≤ 75 m	45 megohms
> 75 m and ≤ 100 m	40 megohms
> 100 m and ≤ 125 m	35 megohms
> 125 m and ≤ 150 m	30 megohms
> 150 m and ≤ 175 m	25 megohms
> 175 m and ≤ 200 m	20 megohms
> 200 m and ≤ 225 m	15 megohms
> 225 m and ≤ 250 m	10 megohms
> 250m	5 megohms

3.5 Polarity Test

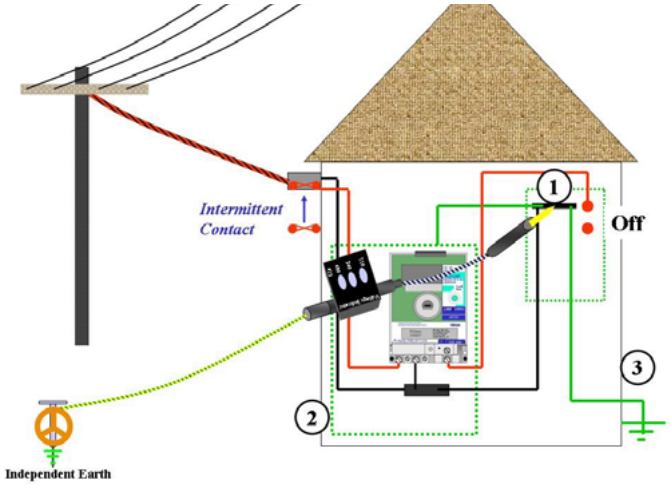
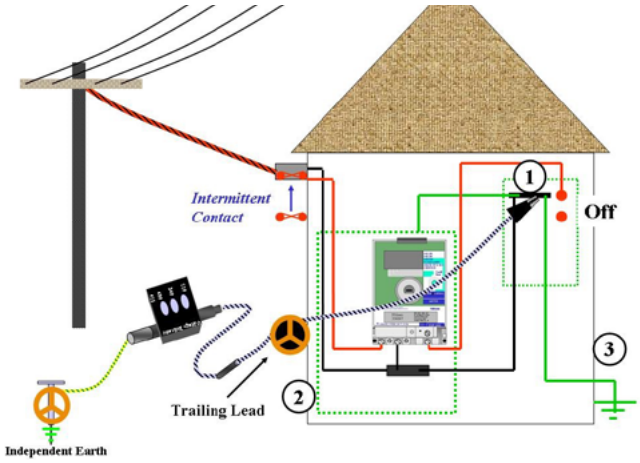
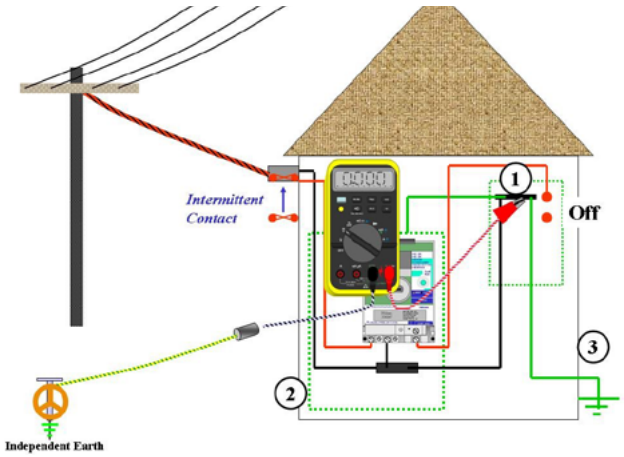
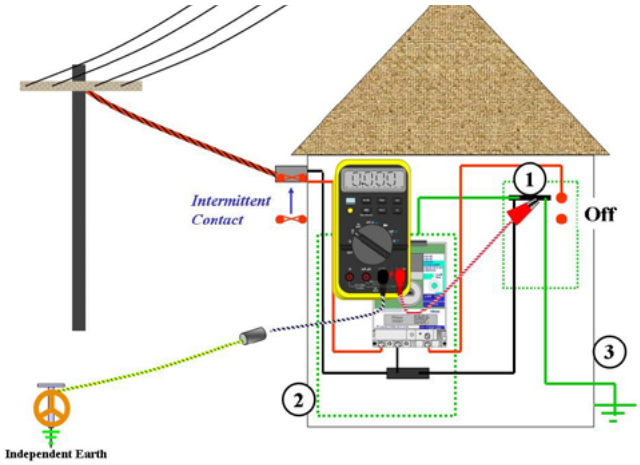
Purpose	To prove the supply neutral is not connected to an energised active conductor and the supply active/s are connected to the mains active.	
Equipment Required	• Voltage Indicator • Independent Earth • Neutral & Supply Tester (see Note)	
Method	1. Isolate Supply Conductors from; a. Installation active/s b. Installation neutral. 2. Test the supply conductors as follows:	
Results	3. Independent earth to supply neutral. 4. Independent earth to supply active/s. 5. Supply active/s to supply neutral. 6. Between supply actives.	Zero Volts 230 Volts 230 Volts 400/460 Volts

Typical Polarity Testing at Meter Position Single Phase		3. Independent earth to supply neutral. 4. Independent earth to supply active. 5. Supply active to supply neutral.
Typical Polarity Test on a Multiphase Installation		3. Independent earth to supply neutral. 4. Independent earth to supply active/s. 5. Supply active/s to supply neutral. 6. Between supply actives.

Typical Polarity Test at Installation Switchboard		3. Independent earth to supply neutral. 4. Independent earth to supply active/s. 5. Supply active/s to supply neutral. 6. Between supply actives. **Note:** Polarity testing at installation switchboards is permitted by authorised personnel only.

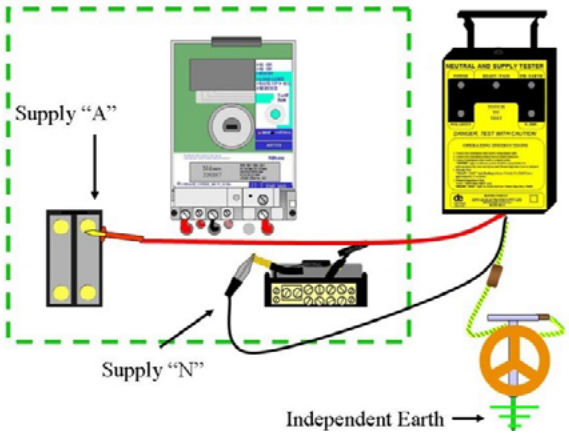
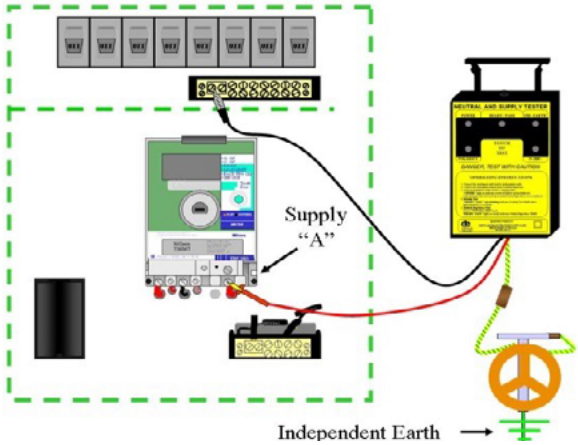
3.6 Check Test

Purpose	To assist in proving the polarity of supply to the Customers Main switchboard is correct.
Equipment Required	• Voltage Indicator • Independent Earth • Low Voltage Stick & Fuse Head where required • Trailing lead where required.
Method	1. Install independent earth, connect voltage indicator to independent earth, test voltage indicator and circuit. 2. Intermittently energise installation wiring via the service protection device (SPD) and simultaneously test between the independent earth and the established Neutral Integrity Test Point. 3. Test voltage indicator and circuit. 4. Energise installation via the service protection device. 5. Energise all active terminals at the meter position and simultaneously test between independent earth and the Neutral Integrity Test Point. 6. Test voltage indicator and circuit. **NOTES:** *For Single Person Check Testing – Trailing Lead Method*, a trailing lead is placed in series with the circuit at Point 1. The SPD may be either service fuse/s or a circuit breaker in an underground situation.
Results	Zero Volts reading to be obtained for all Check Tests – Peak & Off Peak Loads and all Switching terminals.

Typical Check Test Arrangement (Two Persons Required).		**Arrangement Required** One person intermittently energises the installation via the SPD whilst the other simultaneously tests at the NITP. Check Test is conducted to the previously established Neutral Integrity Test Point (NITP).
Typical Check Test Arrangement OH (Single Person – Trailing Lead Method)**.**		**Arrangement Required** A trailing lead placed in series with the testing equipment is used to extend the testing circuit and allows for a single person to perform Check Testing. Check Test is conducted to the previously established Neutral Integrity Test Point (NITP).
Typical Check Test Arrangement OH (Single Person – Volt Meter Method)**.**		**Arrangement Required** An approved digital multi/volt meter. Check Test is conducted to the previously established Neutral Integrity Test Point (NITP).
Typical Check Test Arrangement UG (Single Person – Trailing Lead Method)**.**		**Arrangement Required** A trailing lead placed in series with the testing equipment is used to extend the testing circuit and allows for a single person to perform Check Testing. Check Test is conducted to the previously established Neutral Integrity Test Point (NITP).

3.7 Neutral & Supply Test

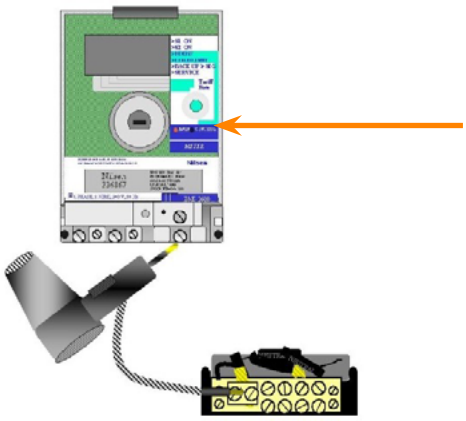
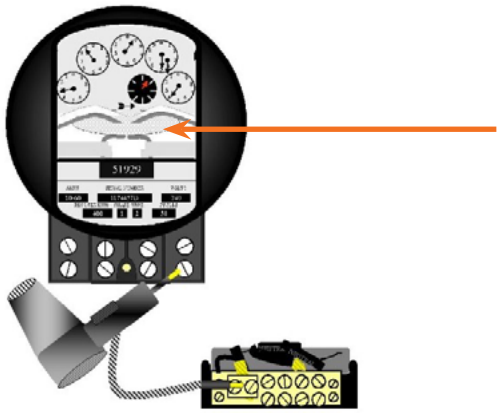
Purpose	The purpose of testing with a Neutral & Supply Tester in accordance with these *Installation Supply Connection Tests & Procedures* is to demonstrate that the active and neutral connections from the network supply to the customers installation are correct.
Equipment Required	• Neutral & Supply Tester • Independent Earth • Trailing lead where required.
Method	1. Ensure test location is appropriately prepared. 2. Connect the instrument earth lead to the independent earth. 3. Connect the instrument neutral lead to the supply neutral. 4. Connect the instrument active lead to the supply active. 5. Polarity Test. 6. Neutral Impedance Test • Touch "Touch to Test" pad where fitted.
Results	**POWER** light on indicates power available and polarity test will automatically start and repeat until the Neutral Impedance test is initiated. **READY/PASS** light flashing indicates Polarity Test PASS *OR* digital display NST- indicates **PASS** & test result value. **READY/PASS** light on steady Neutral Impedance **PASS**. *OR* digital display NST- indicates **PASS** & test result value **Note:** this may include parallel earthing paths via MEN points of connected installations.

Typical NST Test at a Meter Position	
Typical Neutral & Supply Testing at a NITP	 **Note:** Neutral & Supply Testing at a Neutral Integrity Test Point is conducted after all neutral connections have been made

NEUTRAL AND SUPPLY TESTER ALARMS – Trouble Shooting Error Indication	
Power	No "**POWER**" light indicates no supply or instrument failure. Test the instrument on known live supply. If no " POWER" indication return the instrument for service. If applied voltage is less than 150V AC "POWER" light will be dim but no subsequent test will be undertaken and no change of indication will occur. Check with voltmeter, isolate service and notify supervisor.
Polarity Test	**"IND. EARTH", "POLARITY" & "N. IMP"** flashing in sequence indicates instrument failure. Use alternative tester to complete Polarity Test and return the instrument for service. **"POLARITY"** light **on** indicates active voltage outside acceptable range. Confirm with voltmeter or approved tester and check connections. If confirmed, immediately isolate the service and then identify the fault. Possible Causes: • Instrument connected phase to phase • Supply voltage outside range due to poor connections on test probes • Overloaded transformer • Poor connections on supply active • High circuit impedance (e.g., excessive cable length). **"IND. EARTH" & "POLARITY"** lights flashing in sequence indicates voltage on neutral is higher than voltage on active. Immediately isolate the service and identify the fault. Possible causes: • Reverse polarity. **"IND. EARTH"** light on indicates independent earth connections too high for accurate test or voltage on neutral too high. Check connections to independent earth, try for more effective earth and repeat all tests. Possible Causes • Poor connections to independent earth. • Neutral impedance too high Voltage rise in neutral (excessive neutral current e.g. phases out of balance).
Neutral Impedance Test	**"N. IMP"** light on indicates higher than acceptable (**1 ohm**) impedance in supply neutral and/or active Immediately isolate the service and identify the fault. Possible causes: Active to Neutral impedance too high due to • Poor connections on test probes • Damaged conductors in supply neutral and/or active • MEN system impedance above **1 ohm** • Supply cable too small or too long • Connection has been made to de-energised active or switch conductor
NOTE: See Section 5 Appendices for NST Indicator chart and Fault finding for both M1110 and M1120 NST units.	

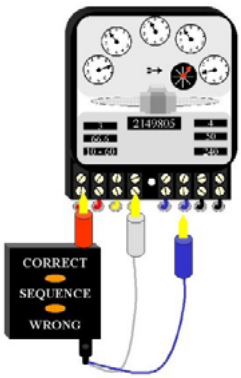
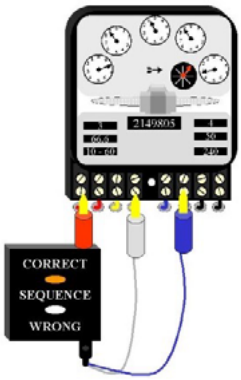
3.8 Meter Load Test

Purpose	To verify that the metering equipment is registering consumption of electrical energy.
Equipment Required	• Load Tester
Method	With the first connection being made to the supply neutral test between the neutral and each load active conductor.
Results	Consumption of electrical energy is registered.

Typical Load Testing on Meters		Early model electronic meter indicates consumption by a pulsing indicator
		Electro Mechanical meters indicate energy consumption by the rotation of the disc in the direction identified on the meter face.
	NOTE: Refer to Manufacturer/Distributor instructions that may apply to various makes/types of meters	
Note: Hair dryer type testers have potential to disturb dust and debris that may be present in close proximity of test location e.g. meter enclosures. Alternative testers are available. (Refer to individual Distributor procedures)		

3.9 Phase Sequence Test

Purpose	The purpose of phase sequence testing is to ensure that: • Phase sequence is correct at the meter position on new installations; and • The original phase sequence is restored to the customer's main switchboard on existing installations.
Equipment Required	• Phase Sequence Tester
Method	At the test location: 1. Connect the red phase probe to the red phase position 2. Connect the white phase probe to the white phase position 3. Make intermittent contact with the blue phase probe.
Results	No Lights "Correct" and "Wrong" Lights Glow "Correct" Light Glows intermittently.

Typical Phase Sequence Test at a Meter		Step 2
		Step 3
	NOTES: • Incorrect phase sequence at metering equipment may cause the metering equipment to register incorrectly. • Incorrect phase sequence at a three-phase motor will cause the motor to run in reverse.	

WORK TYPE	PHASE SEQUENCE TEST
New Installations and Occupancies	Tests must be performed to ensure each 3 phase meter's phase sequence is correct
Previously Connected Installations & Occupancies	Where work is performed upstream of a customers switchboard which may affect phase rotation, tests and checks must be performed to ensure the original phase sequence is restored to the metering and customers equipment, i.e.
a) Phase sequence determined at customer's end prior to disconnection, e.g., Replace a connected service cable or 3 phase meter	Mark corresponding supply cable terminals and ensure replacement cable is connected in accordance with the original phase sequence. **Note: For meter changes where there is a possibility of transposition of wiring, a phase sequence test is to be conducted at the customer's switchboard before and at the completion of the work.**
b) Phase sequence not determined at customer's end prior to disconnection e.g., Replace a disconnected service cable or 3 phase meter	Test to ensure each 3 phase meter phase sequence is correct; and i) Where it is known or suspected that the customer's equipment includes 3 phase motors - ensure their correct rotation. ii) Where correct rotation of the customers motors is unable to be determined: • Connector must not connect supply to that equipment until the motor/s correct rotation can be established. • The customer must be advised of this condition

Information contained within this section shall be read in conjunction with all sections of this Installation Supply Connection Tests & Procedures manual.

CONNECTION PROCEDURES

4.1 Introduction

These procedures have been developed to provide for the safe connection of electrical supply to installations in Victoria.

This section covers the test procedures for New, Existing, and other unique procedures, which may require the use of several test procedures to be used to complete the task. When using the procedures, there may be a footnote symbol/s at the end of a step. It is important to read the footnote at the bottom of the procedure, to ensure the person understands the additional requirement or reference they may need to use in conjunction with a particular step.

4.2 Principles of Testing & Connection of Electrical Installations

4.2.1 Introduction

The following principles apply to testing and connection work within the scope of these procedures. Connection work shall be undertaken in accordance with individual connection procedures to ensure the application of these principles.

4.2.2 Objective

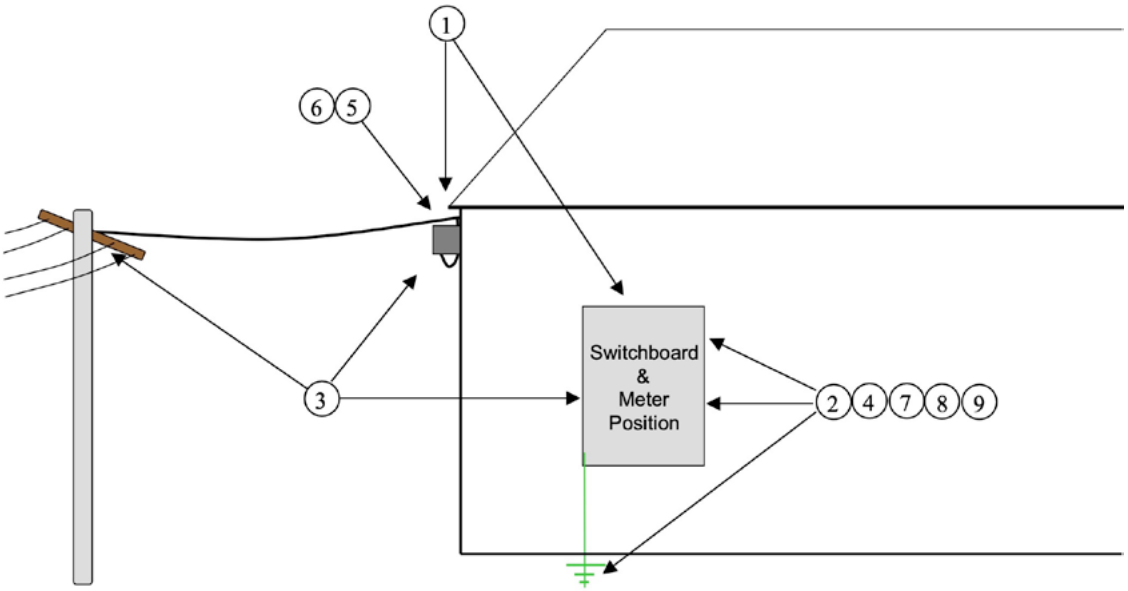
To ensure the safe connection of electrical installations to the Victorian Electricity Supply Network by:

- Providing correct polarity of electrical connections to the customer's main switchboard.
- Providing a supply neutral of less than **1 ohm** impedance to the customer's main switchboard.
- Providing correct phase sequence to the customer's main switchboard.
- Maintaining safe systems of work during the connection process.

4.2.3 Principles

1. All conductive components and associated work area assumed to be de-energised shall be proven de-energised by test, prior to the commencement of work.
2. Installation Under Test notice/s shall be placed at any point of which live apparatus is exposed to, or accessible by, other parties not involved in the connection process, e.g., electricians, general public.
3. All neutral conductors/connections shall be readily identifiable by colour or termination position and tagged where required.
4. A Neutral Integrity Test Point (NITP) shall be established on the electrical installation to validate Check Testing and Neutral & Supply Testing Procedures.
5. Polarity Testing shall be conducted on the Supply/Service conductors where the supply neutral conductor has been disturbed, connected or disconnected and reconnected.
6. Supply Testing shall be conducted on the Supply/Service conductors where the service neutral conductor has been disturbed, connected or disconnected and reconnected.
7. Check Testing shall be conducted:
    - To ensure correct polarity of neutral connections to the main switchboard.
    - With switching circuits energised to ensure correct polarity of neutral connections on any occasion where the connection work has involved the installation of new metering equipment or alterations or additions to existing metering equipment.

8. A final Neutral and Supply Test shall be conducted to an established NITP.
9. Phase sequence shall be established:
    - On new installations to be correct to the metering equipment; and
    - On existing installations in a manner to ensure the correct operation of 3 phase equipment.
10. Installation or changes to Metering equipment to be checked for correct functionality.



4.3 Supply Capacity Control Device/s - Installation configurations

4.3.1 Introduction

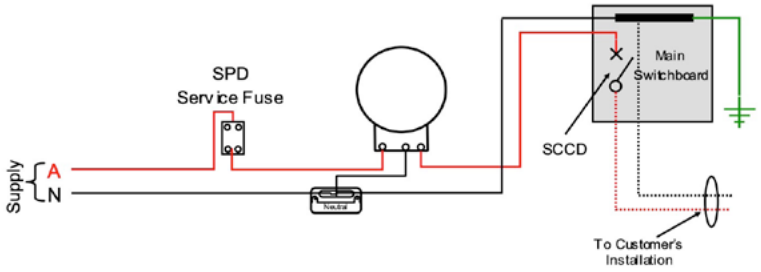
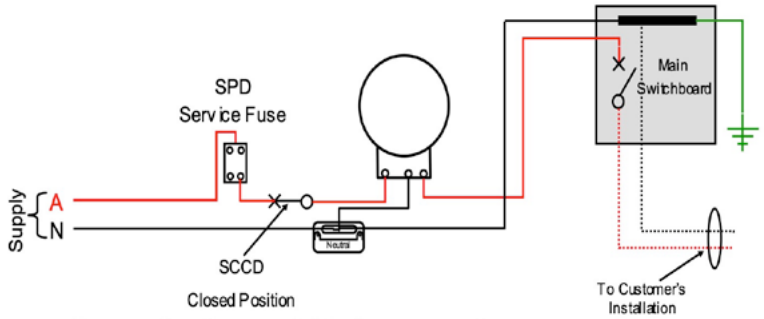
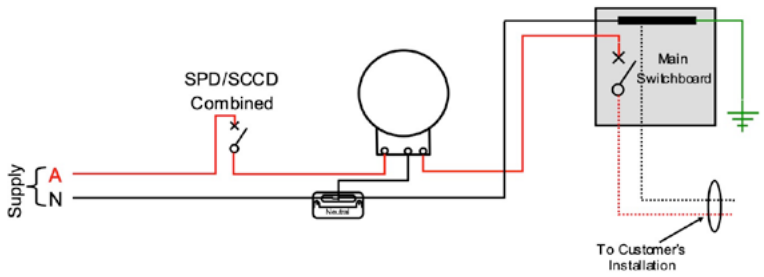
Supply Capacity Control Devices (SCCD) are a maximum demand device (circuit breaker) that will operate when the customers load exceeds the limit specified by the electrical Distributor.

The location of the device within the installation wiring may vary depending upon the wiring arrangements as depicted below.

Location 1	In the metered mains where they will assume the role of the customers main switch/s.
Location 2	Un-metered mains between the Service Protection Device (SPD) and the Metering Equipment.
Location 3	In the un-metered mains providing dual roles as the SCCD and SPD

4.3.2 Connection Testing Procedure Variations where SCCD's are fitted

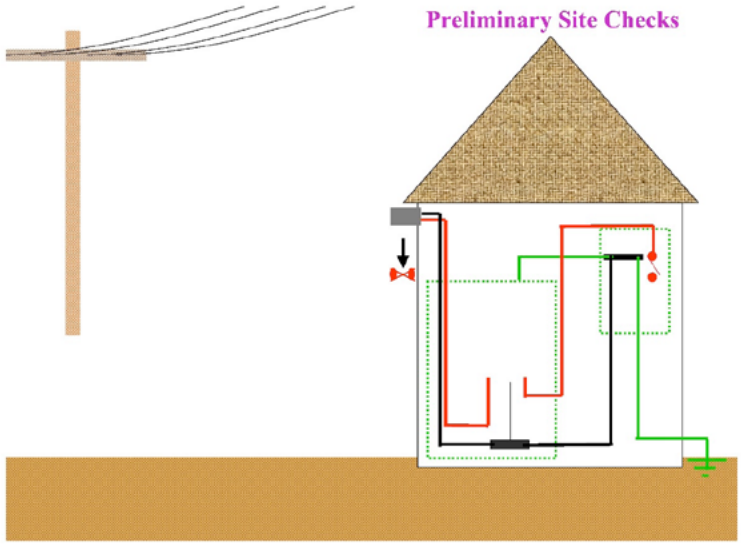
To achieve the objective of ensuring correct polarity of electrical connections to the customer's main switchboard the following shall be required:

Typical Arrangements	
Location 1 No additional action required.	
Location 2 SCCD shall be maintained in the On/ Closed position for any circumstances where work involves connection / disconnection or replacement of metering equipment e.g. new installations or metering alterations/additions.	 *Some situations exist but– now no longer permitted*
Location 3 The SCCD shall be placed in the Off/Open position for Polarity and NST testing of incoming supply conductors where applicable. **Check Testing** shall be performed by intermittently closing and opening the SCCD	

4.4 New Installation Overhead Supply up to 100A

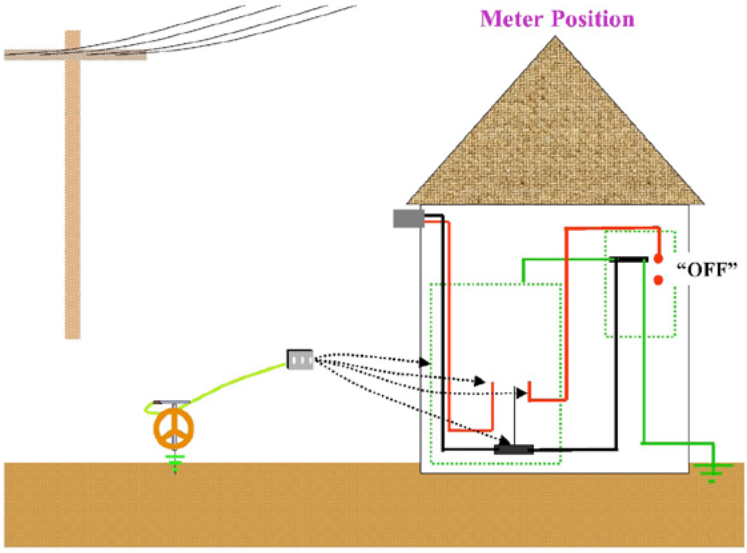
Preliminary Site Checks

1. Visually check for alternative supplies
2. Check supply availability.
3. Remove service fuse wedges

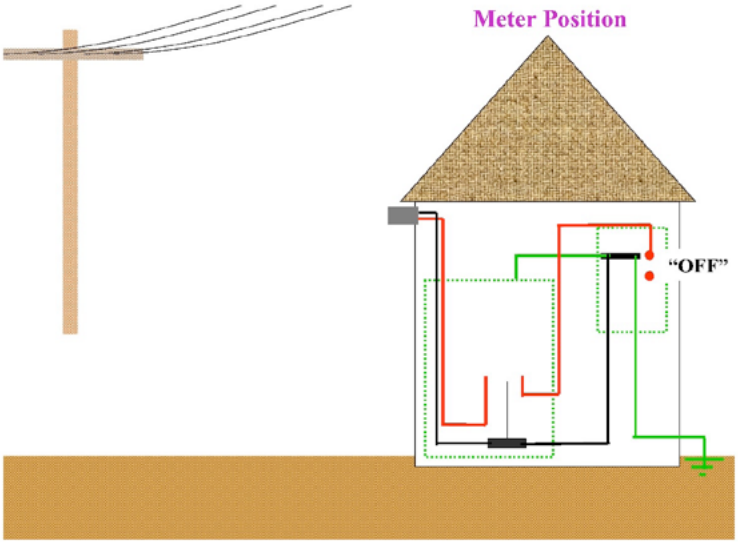


Meter Position

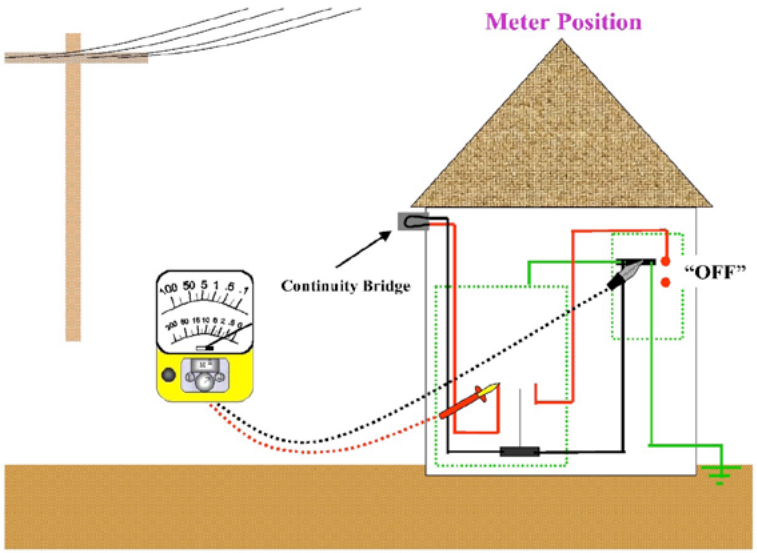
4. Test for de-energised. *
5. Install “Installation Under Test” notice.
6. Check all main switches are “OFF”. (Refer to *“Supply Capacity Control Device/s”* (Sect 4.3) if fitted



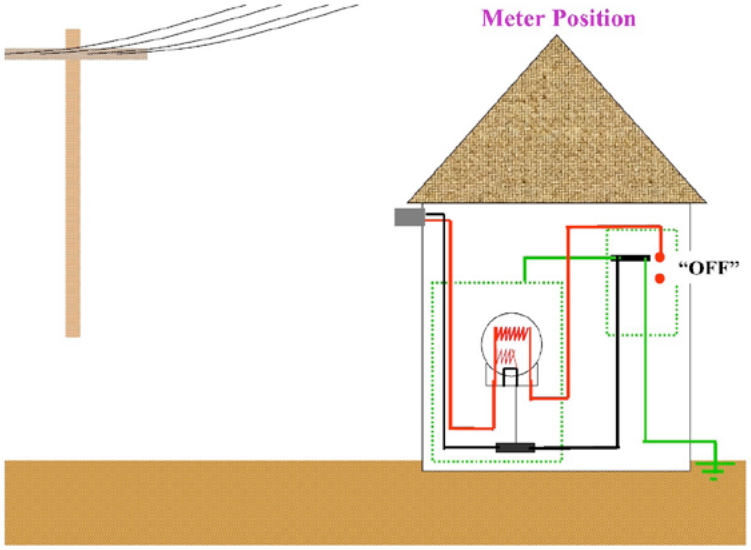
7. Identify consumer’s incoming mains and all metered conductors and mark/tag incoming neutral conductor as appropriate.(Refer Section 2.6)
8. Ensure incoming and outgoing neutrals are connected at neutral link



9. Establish Neutral Integrity Test Point. *

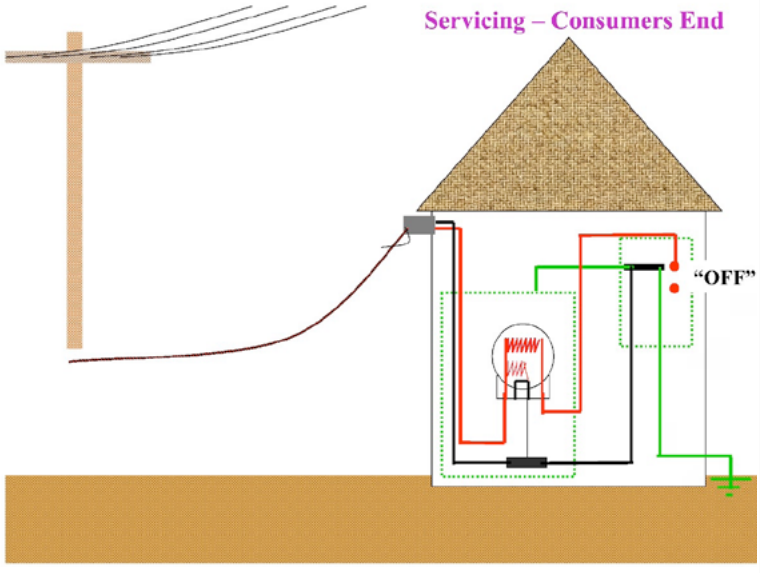


10. Install metering equipment – Refer to Distributor procedures.



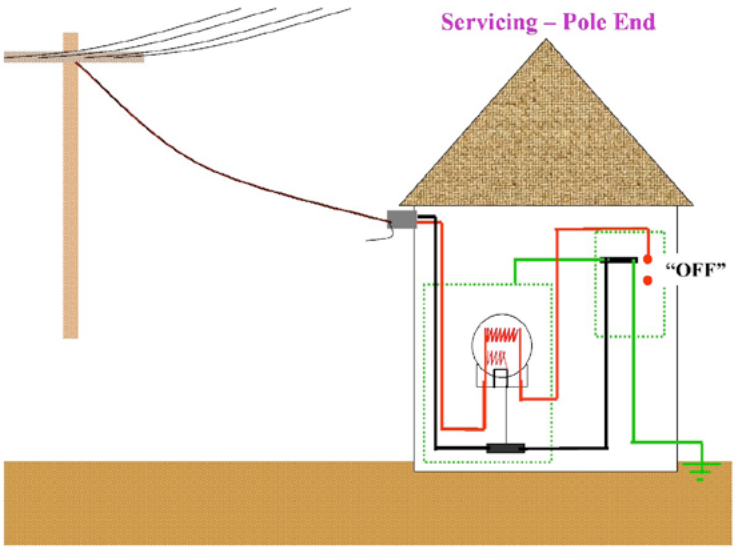
Servicing – Consumers End

11. Erect service cable.
12. Identify and tag service neutral and identify consumer's main neutral.
13. Identify and connect active service conductor/s to line side of fuse terminal/s.
14. Ensure service neutral is disconnected and made safe.



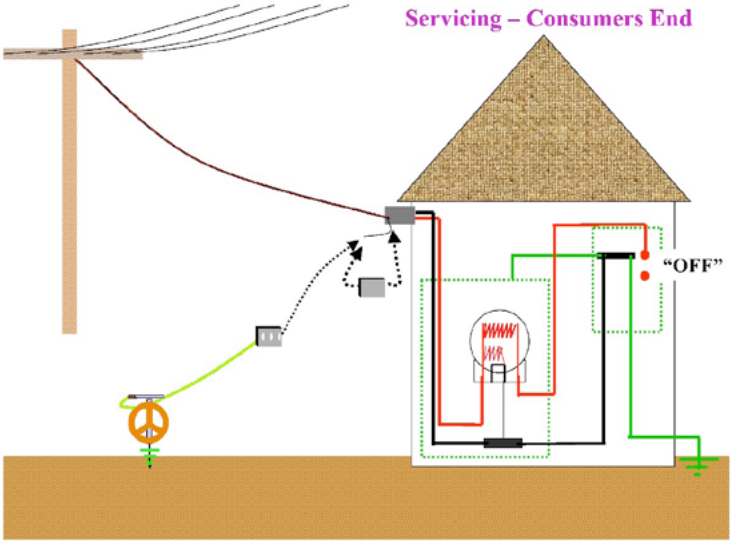
Servicing – Pole End

15. Erect Service Cable.
16. Visually identify service and supply neutral conductors, tag as appropriate and connect.
17. Identify and connect active service conductors to the appropriate active mains

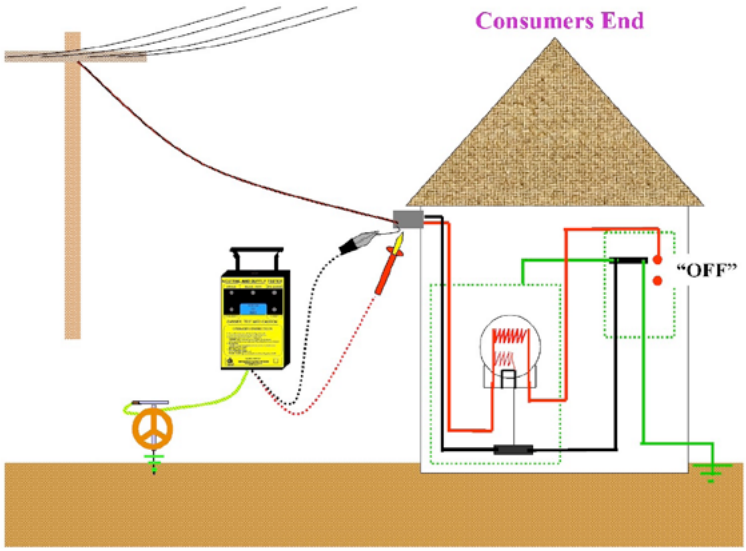


Servicing – Consumers End

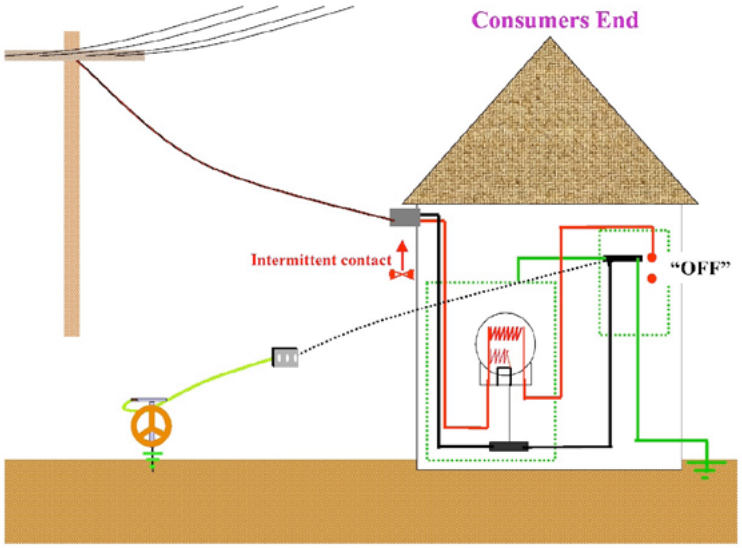
18. Polarity Test service cable conductors. *



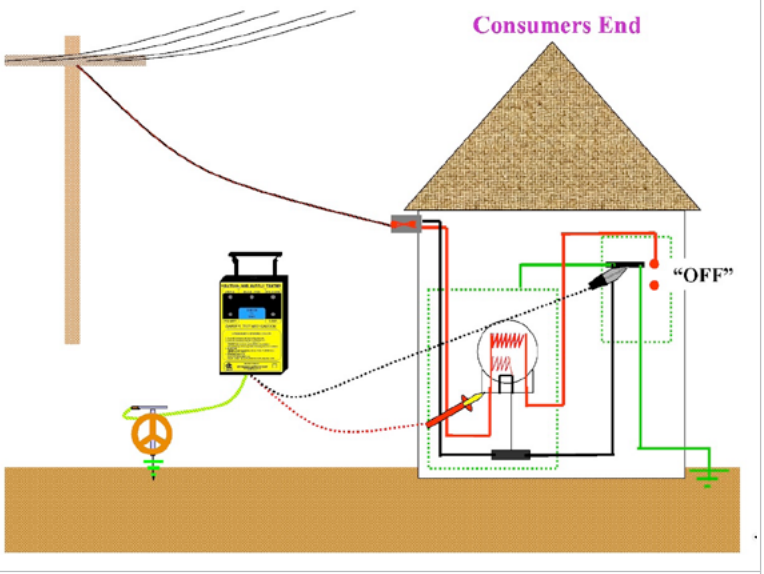
19. NST incoming customers neutral. *



20. Connect Service Neutral to Consumer's Mains Neutral.
21. Check Test/s (includes switched circuits) *
22. Leave service fuse/s inserted

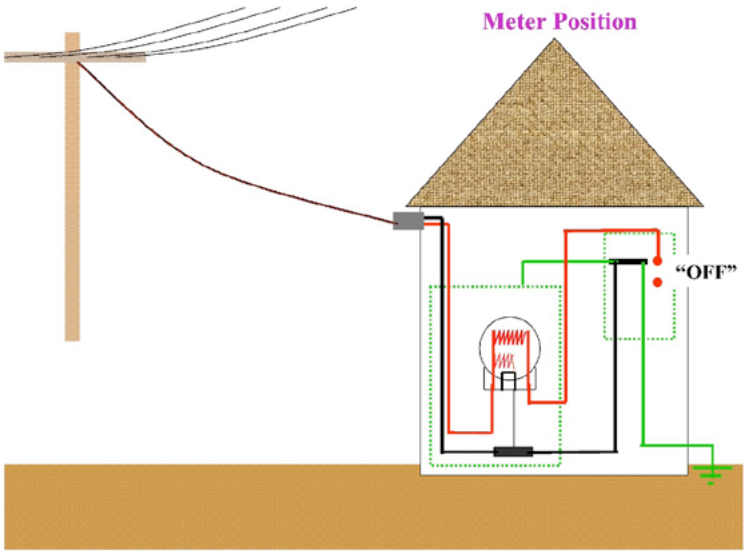


23. NST Test to Neutral Integrity Test Point. *



Meter Position

24. Phase Sequence Test (Three Phase Only) *
25. Program meter/s and time switch (As applicable)
26. Load Test. *
27. Equipment functionality test.
28. Check all connections and equipment.
29. Seal equipment in accordance with Distributor procedures.
30. Leave "On" or "Off" in accordance with Distributor procedures.



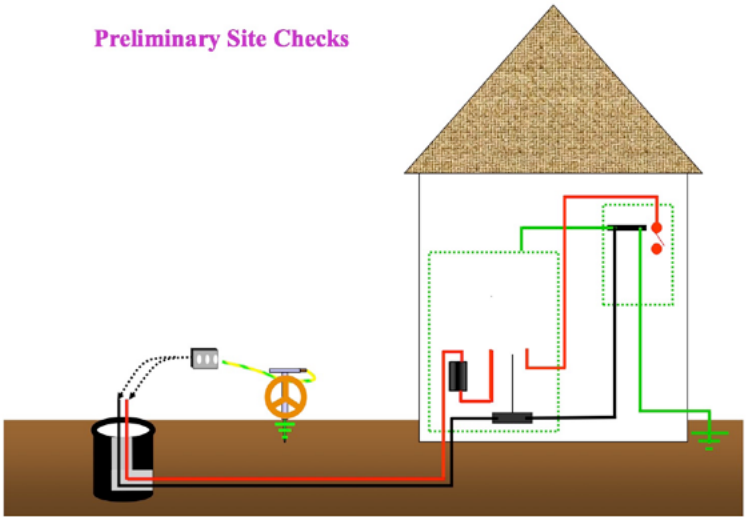
* Refer to individual test procedures.

4.5 New Installation Underground Supply - Supplied from a Pit

> **Note** **For remote metering enclosure without switchboard refer to page 12 of this procedure.**

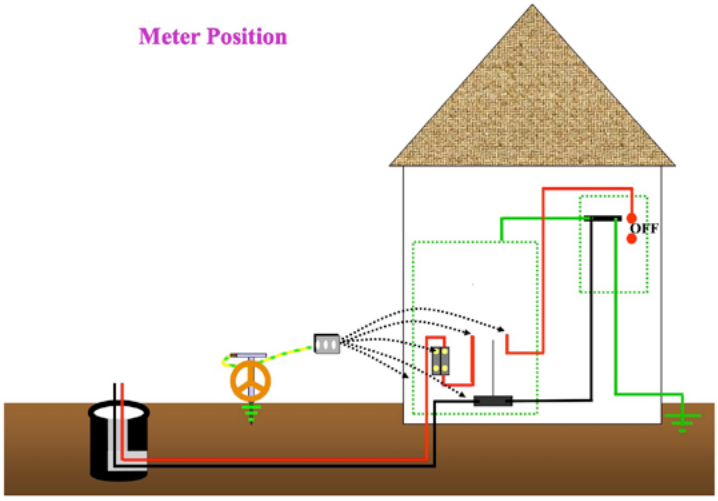
Preliminary Site Checks

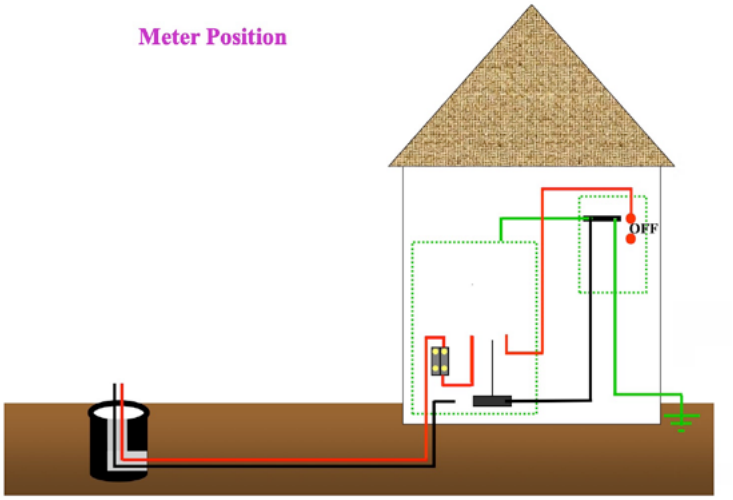
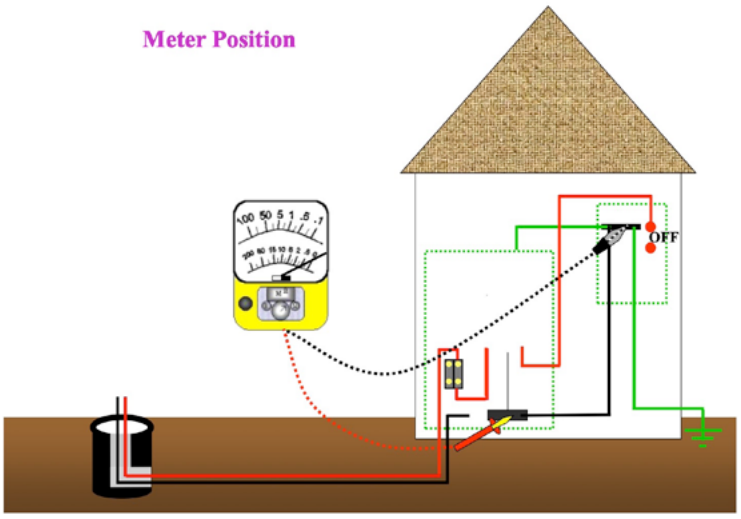
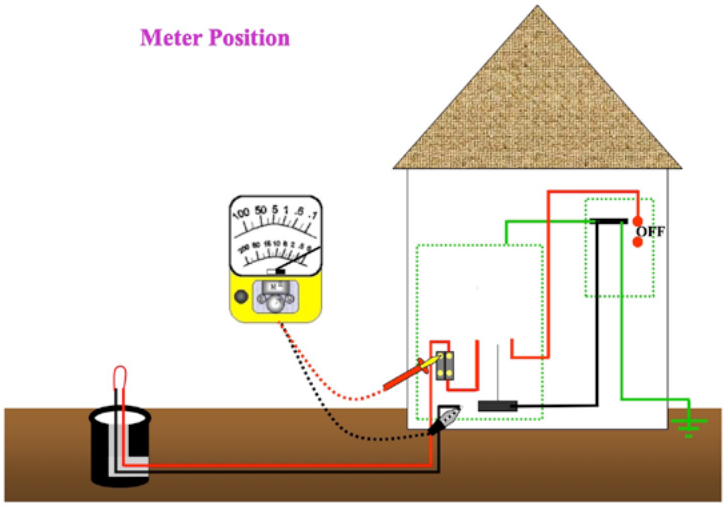
1. Visually check for alternative supplies
2. Check supply availability.
3. At the pit test for de-energised consumer's mains.* (only required where the consumers mains cannot be positively identified).

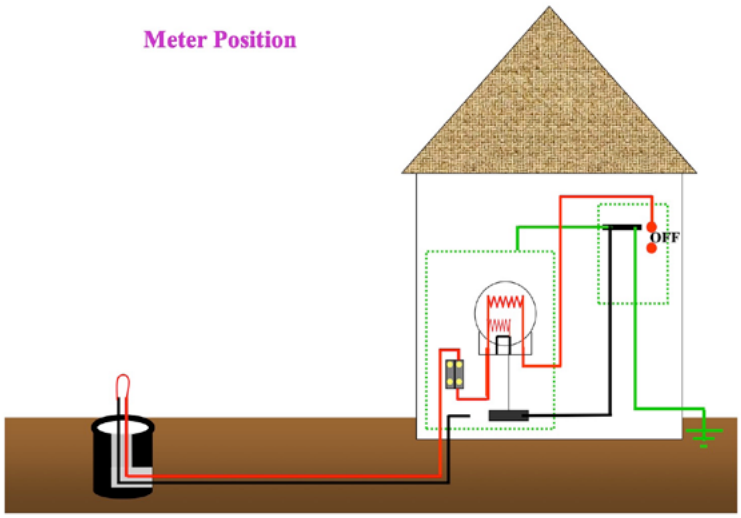
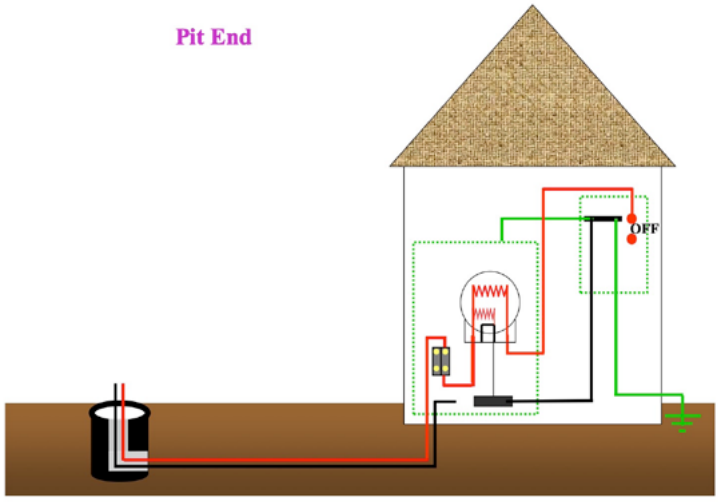
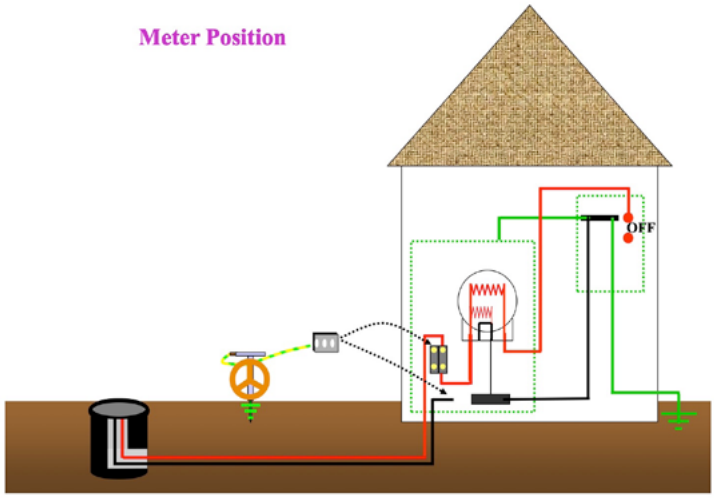


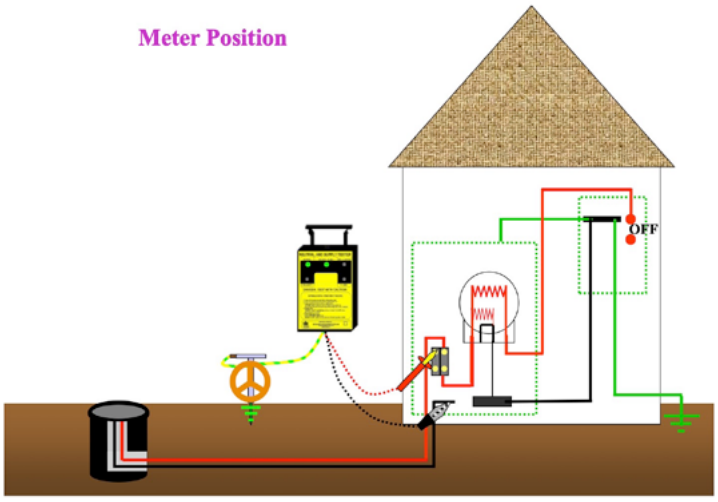
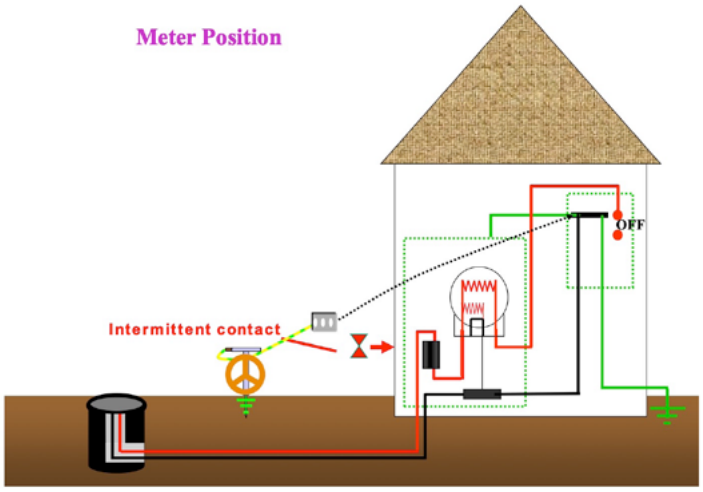
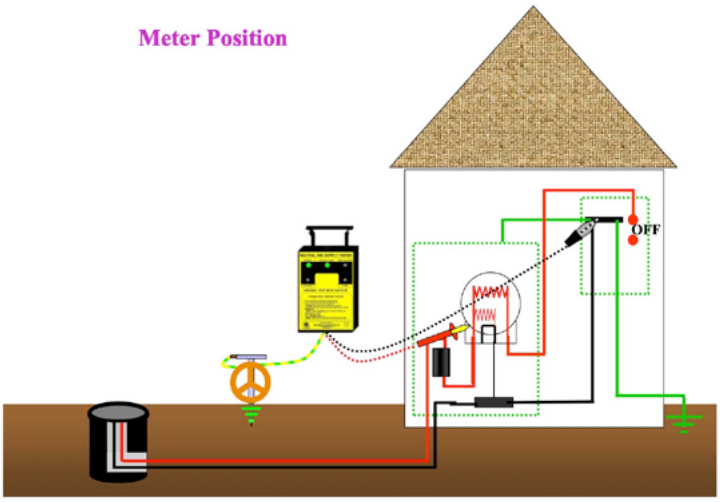
Meter Position

4. Test for de-energised. *
5. Ensure service fuse wedges and other meter panel fuse wedges are left out.
6. Install "Installation Under Test" notice/s.
7. Check main switches are "OFF".

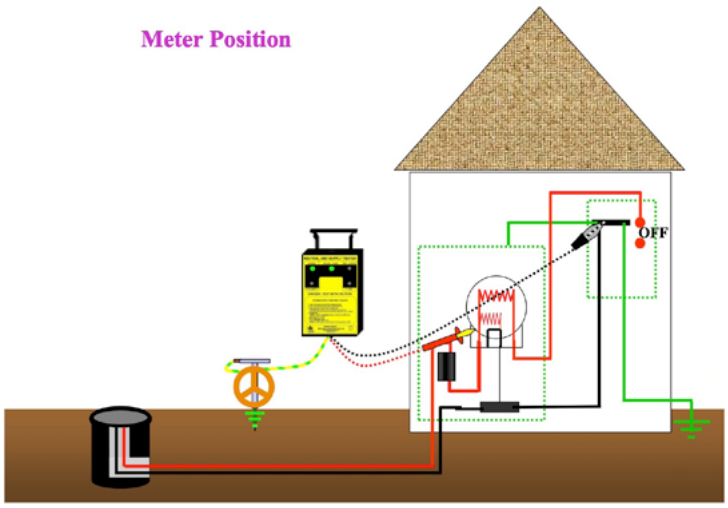


8. Identify consumer's incoming mains and all metered conductors. 9. Confirm connection of outgoing neutral is correct. 10. Identify the consumer's incoming mains neutral and ensure it is disconnected and made safe.	
11. Establish Neutral Integrity Test Point. *	
12. Conduct Underground Consumers Mains Test. *	

13. Install Metering Equipment.	
Pit 14. Identify and tag consumer's mains and supply neutral conductors and connect. 15. Identify and connect service active/s with appropriate mains active/s.	
Meter Position 16. Polarity Test all incoming consumers mains conductors.*	

17. NST incoming customers neutral. *	
18. Connect consumer's mains incoming neutral conductor. 19. Check Test/s. (includes switched circuits) * 20. Leave service fuse/s inserted.	
21. NST Test to Neutral Integrity Test Point. * 22. Phase Sequence Test (3 Phase only) *	

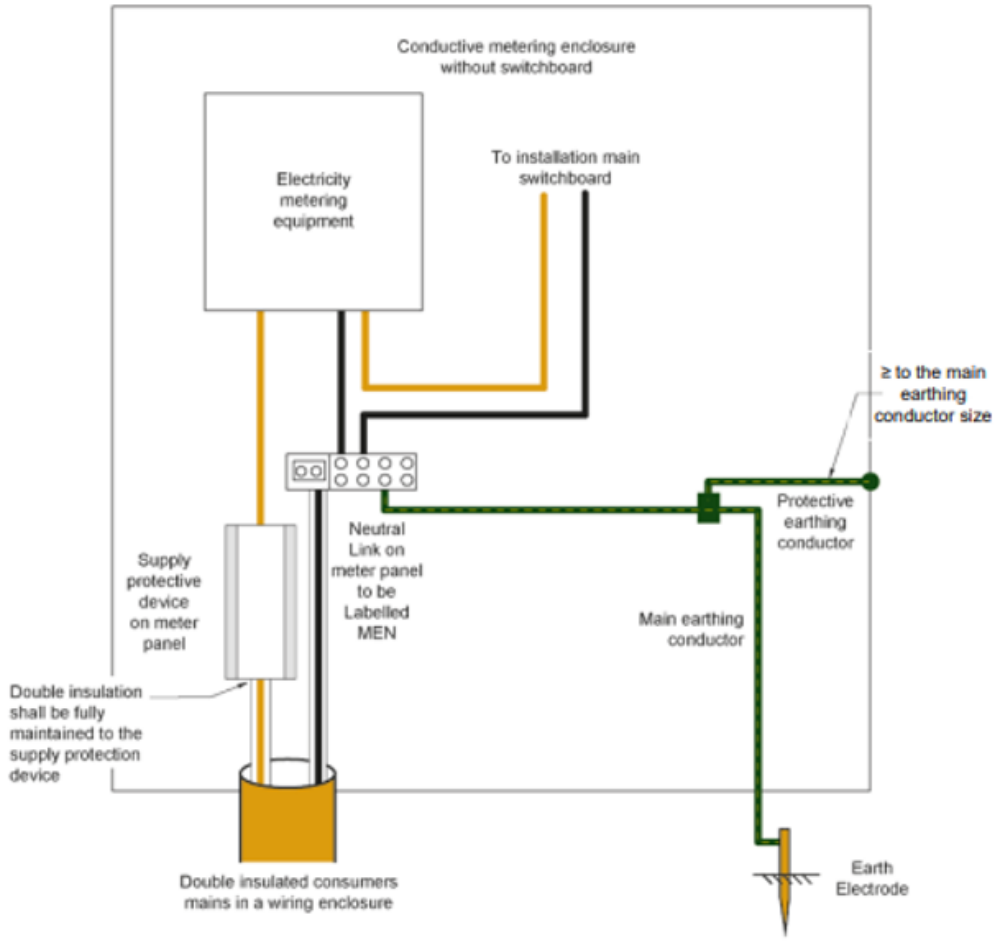
23. Program meters and time switch.
24. Load tests *
25. Equipment functionality tests.
26. Check all connections and equipment.
27. Seal Equipment.
28. Leave ON or OFF in accordance with Distributors procedures.



* Refer to individual test procedures.

Remote Metering Enclosure Without A Switchboard

For testing of this type of installation, shall be treated as Multiple Occupancy. The person completing the connecting and testing shall be a Network LEI or suitable trained in Multiple Occupancy as per table 1 VESI Skills and Training Guideline.



4.6 New Installation Supply Connections Greater than 100amps - Overhead or Underground (or Customer Initiated)

4.6.1 Introduction

The performance of this connection procedure shall only be undertaken by personnel approved by the relevant network operator to undertake the task. Completion of this procedure may require a combination of Lineworkers, Electrical Inspectors and Metering Technicians. Personnel undertaking this procedure are to work in conjunction (where required) to ensure all applicable testing is completed as per this procedure.

4.6.2 Testing Principles and Definitions

Supply Point

The Supply Point or Distributor's Point of Supply is the first point where supply is available upstream of a Point to be connected. The Supply Point will vary dependent upon the installation arrangement and may be the Substation terminals, Distributor pit, pillar, Fused Switch Disconnector (FSD), POA, etc.

Point to be Connected

The point to be connected is the first point downstream of the Supply Point where the neutral or MEN is required to be lifted for the purpose of Polarity and NST testing, e.g., Customer pillar, cubicle, main switchboard, Distribution switchboard, common meter position or meter position.

Overhead Test Points

For overhead connections >100A, NST and polarity testing are to be undertaken at both the Supply Point (POA) and at the switchboard/MEN.

Un-metered and Metered Conductors

Conductors comprising the consumer's mains, common consumer's sub-mains and sub-mains supplying individual group metering positions and remote main switchboards are required to undergo pre energisation tests. The tests shall include; Insulation Resistance, Continuity and upon energisation, Polarity, Neutral Impedance (NST) and Phase Sequence.

Multiple Occupancies

For individual occupancy consumer's sub mains supplied from group metering positions,

Insulation Resistance testing is only required to be conducted on active conductors. Lifting of individual occupancy neutrals at the group metering position is not permitted for the purpose of performing these tests.

Existing Installation >100A, e.g., Alterations or Additions

Completion of the applicable steps from the procedure below are to be undertaken to ensure that the principles of the VESI procedures (as described in Section 4.2) are adhered to.

Main Neutral unable to be disconnected

Refer Note 2 below.

4.6.3 Testing Procedure

Preliminary Site Checks (all un-metered portions and remote main switchboards)

1. Visually check for alternative supplies.
2. Check supply availability.

Supply Point

3. Test for de-energised.*
4. Ensure main switches are in the Off position and service protection devices (e.g., circuit breaker/fuses) are open/removed where applicable.
5. Install installation under test notice/s (UG only).

Point to be Connected / Switchboard / Meter position

6. Test work area for de-energised.*
7. Install installation under test notices.
8. Ensure all Main Switch/s are in the off/open position.
9. Ensure metering, equipment and associated wiring is completed as appropriate.
10. Remove fuses of ancillary equipment upstream of the main switches where applicable (Refer Note 2).
11. Remove voltage fuses from CT chamber where applicable.
12. Identify incoming active conductors.
13. Identify main neutral conductor and disconnect from main neutral bar/MEN point. (Refer Note 2).
14. Perform an insulation resistance test of the consumer's mains conductors. * (Refer Note 2).
15. Test continuity and confirm identification of consumer's mains including neutral. *

Supply Point

For an underground connection:

16. Visually identify mark/tag the supply neutral and connect.
17. Visually identify the supply active conductors and connect.
18. Energise the point to be connected.

For an overhead connection:

- Erect and energise the new service and undertake tests as per steps 11 to 20 in VESI.
- procedure 4.4, New Overhead Connection up to 100A.

18a. Energise the point to be connected.

N.B. It is intended for this procedure to be completed in its entirety with all applicable personnel on site, however, where a servicing crew is required to erect the overhead service at a separate time, individual Distributor procedures shall be in place to ensure completion of all applicable tests and connection steps.

Point being Connected / Switchboard / Meterboard

19. Polarity Test, the incoming Neutral & active conductor using an independent earth. *++
20. NST Test the incoming neutral conductor and each individual phase conductor. *++
21. De-energise supply conductors to allow safe reconnection of neutral to neutral bar/MEN point. (Refer Note 3 for mains tee joint)
22. Reconnect main neutral conductor to the main neutral bar/MEN point. (Refer Note 2).
23. Restore fuses of ancillary equipment upstream of the main switches (Refer Note 2)
24. Restore CT metering fuses where applicable.
25. Re energise supply conductors (where applicable).
26. Final NST Test to MEN bar/neutral bar. * ++ (Refer Note 2)
27. Phase sequence test.*.

* Refer to individual testing procedures

++ Refer to Appendix (section 5.2) should independent earth not be available for tests

Note 1: Additional Testing for Multiple Occupancies:

For additional tests required on multiple occupancies with direct metered occupancies, refer to VESI procedure 4.8 or for CT metered installations, complete the steps 6 through to 25 above, as applicable.

Note 2: Neutral Unable to be Disconnected

Due to multiple large conductors in parallel, the conductor size or complex installations with multiple sets of ancillary equipment upstream of the main switch/es, it may be impractical to disconnect the service neutral at the customer's main neutral bar.

Where it is deemed impractical, the above procedure remains effective with the following exceptions

- Step 13 - The MEN link is removed by a licenced electrician instead of disconnecting the main neutral.
- Step 14 – Conduct insulation resistance of the consumer's mains active conductors only.
- Step 22 – Reconnect the MEN link
- Step 26 – Final NST Test conducted to a known earthing point downstream of the MEN Link connection.*

Note 3: Installation Supplied by Mains tee Joint

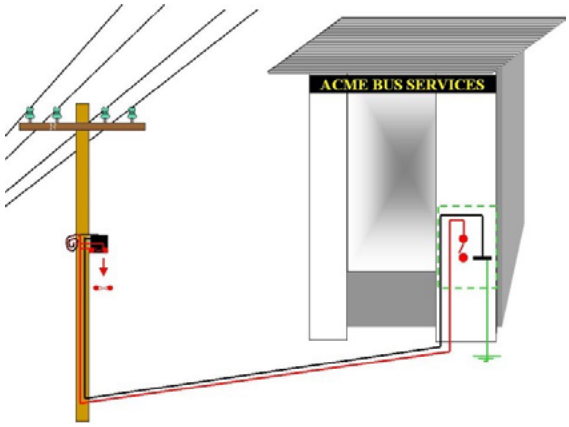
Where the Supply Point for the installation is an underground mains tee joint, disconnection of supply to allow reconnection of the main neutral may be impractical. In these cases, live LV techniques are to be followed as per the individual Distributor requirements to allow reconnection of the main neutral.

4.7 New Installation Unmetered Supply - Not Associated with Multiple Occupancies

Typical Arrangement

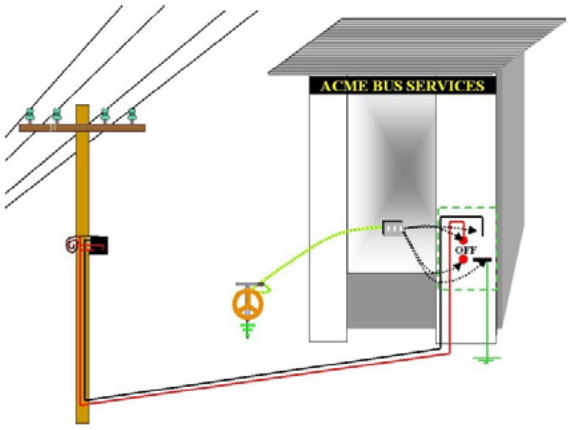
Preliminary Site Checks

1. Visually check for alternative supplies.
2. Check for supply availability.
3. Remove service fuse/s (Where Applicable)

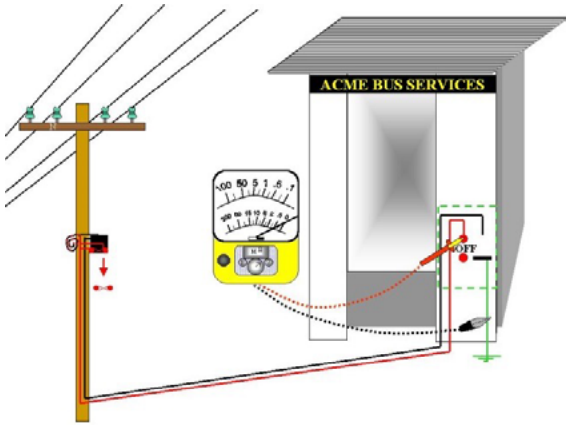


Consumers End - Switchboard

4. Test for de-energised. *
5. Install “Installation Under Test” notice.
6. Ensure consumers main switch/s are “OFF”
7. Identify incoming active and neutral supply conductors
8. Disconnect incoming neutral and make safe.

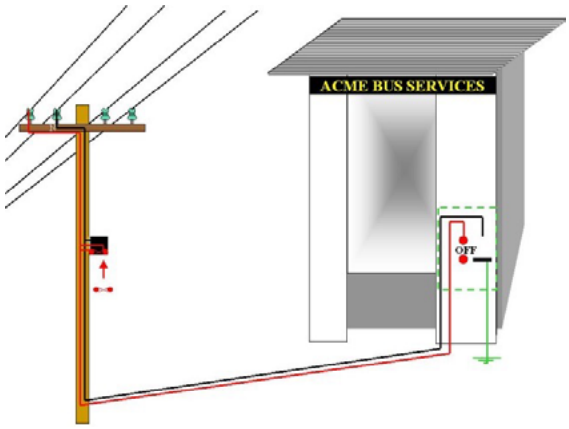


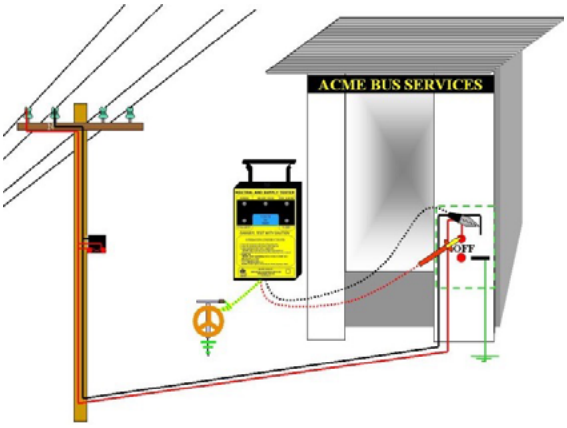
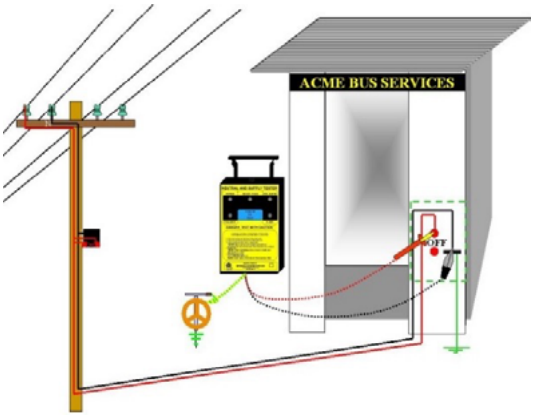
9. Conduct Underground Consumers Mains Test. (As Applicable)*



Supply End

10. Visually identify supply neutral conductors, tag as appropriate and connect.
11. Visually identify supply active conductors and connect.
12. Energise consumer’s mains.



Consumers End – Switchboard 13. Polarity Test * 14. NST Test incoming neutral. *	
15. Connect incoming neutral to MEN bar 16. NST test to MEN bar.* 17. Phase sequence test (3 phase only) 18. Check all connections and equipment. 19. Leave “On” or “Off” in accordance with Distributors procedures.	
* Refer to individual test procedures.	

4.8 New Installation Multiple Occupancy - Direct Metered Occupancies

4.8.1 Introduction

1. **"Supply Point"**

   Is the first point where supply is available upstream of a Point to be connected. The Supply point will vary dependent upon the installation arrangement and include; Distributors Point of Supply [Substation terminals, pit, Fused Switch Disconnector (FSD) etc]; pillar; cubicle; main switch board; distribution switch board, common meter position.

2. **Un-metered and Metered Conductors**

   Conductors comprising the consumer's mains, common consumer's sub-mains and sub-mains to individual group metering positions are required to undergo pre energisation tests. The tests shall include, Insulation Resistance; Continuity and upon energisation; Polarity, Neutral Impedance (NST) and Phase Sequence (where applicable).

   For individual occupancy consumer's sub mains supplied from group metering positions, Insulation Resistance testing is only required to be conducted on active conductors. Lifting of individual occupancy neutrals at the group metering position is not permitted for the purpose of performing these tests.

3. **Required personnel for testing**

   "This connection procedure shall only be undertaken by personnel approved by the relevant network operator to undertake the task. Completion of this procedure may require a combination of Lineworkers, Network LEI and Metering Technicians. Personnel undertaking this procedure are to work in conjunction (where required) to ensure all applicable testing is completed as per this procedure

4.8.2 Un-metered Sections

Preliminary Site Checks (all un-metered portions and remote main switchboards) 1. Visually check for alternative supplies. 2. Check for supply availability.
Supply Point 3. Test for de-energised.* ++ 4. Install "Installation Under Test" notice. 5. Isolate all conductors that energise the Point to be connected.
Point to be Connected 6. Test for de-energised. * 7. Install "Installation Under Test" notice. 8. Ensure all outgoing active conductors are isolated. 9. Identify incoming active and neutral supply conductors. 10. Disconnect incoming neutral and make safe. 11. Perform Insulation Resistance tests as applicable, 12. Conduct Continuity test as applicable, 13. Ensure Insulation and Continuity test results are acceptable. 14. Install Metering Equipment
Supply Point 15. Visually identify supply neutral conductor, tag as appropriate and connect. 16. Visually identify supply active conductors and connect. 17. Energise the Point to be connected.

Point to be Connected
18. Polarity Test incoming neutral.* 19. NST Test. incoming neutral. * 20. Reconnect incoming neutral. 21. NST Test to MEN/Neutral bar. * 22. Phase sequence Test (3 Phase only).* 23. Check all connections and equipment. 24. Leave “On” or “Off” in accordance with Distributors procedures.
* Refer to individual testing procedures ++ Refer to Appendix (section 5.2) should independent earth not be available for tests

4.8.3 Individual Occupancies

Notes

1. Where there is a MEN at the individual occupancy switchboard, the procedure below does not apply. Refer to individual Distributor procedures.
2. The procedure below relates to group metering. Where occupancies are individually metered, refer to testing as outlined in procedure 4.5 for a single occupancy.

Preliminary Site Checks (all unmetered portions and remote main switchboards)
1. Visually check for alternative supplies. 2. Check for supply availability.
Supply Point
3. Test for de-energised.* ++ 4. Install “Installation Under Test” notice. 5. 5. Ensure supply is isolated from occupancy sub mains and metering.
Occupancy Switch Board
6. Test for de-energised. * ++ 7. Install “Installation Under test” notice. 8. Check Isolation switches “OFF”. 9. Identify incoming actives and neutral conductors. 10. Disconnect incoming neutral and make safe 11. Conduct Insulation Resistance test on active conductors as applicable, 12. Conduct Continuity test on active conductors as applicable, 13. Ensure Insulation and Continuity test results are acceptable.
Supply Point
14. Energise occupancy supply conductors.

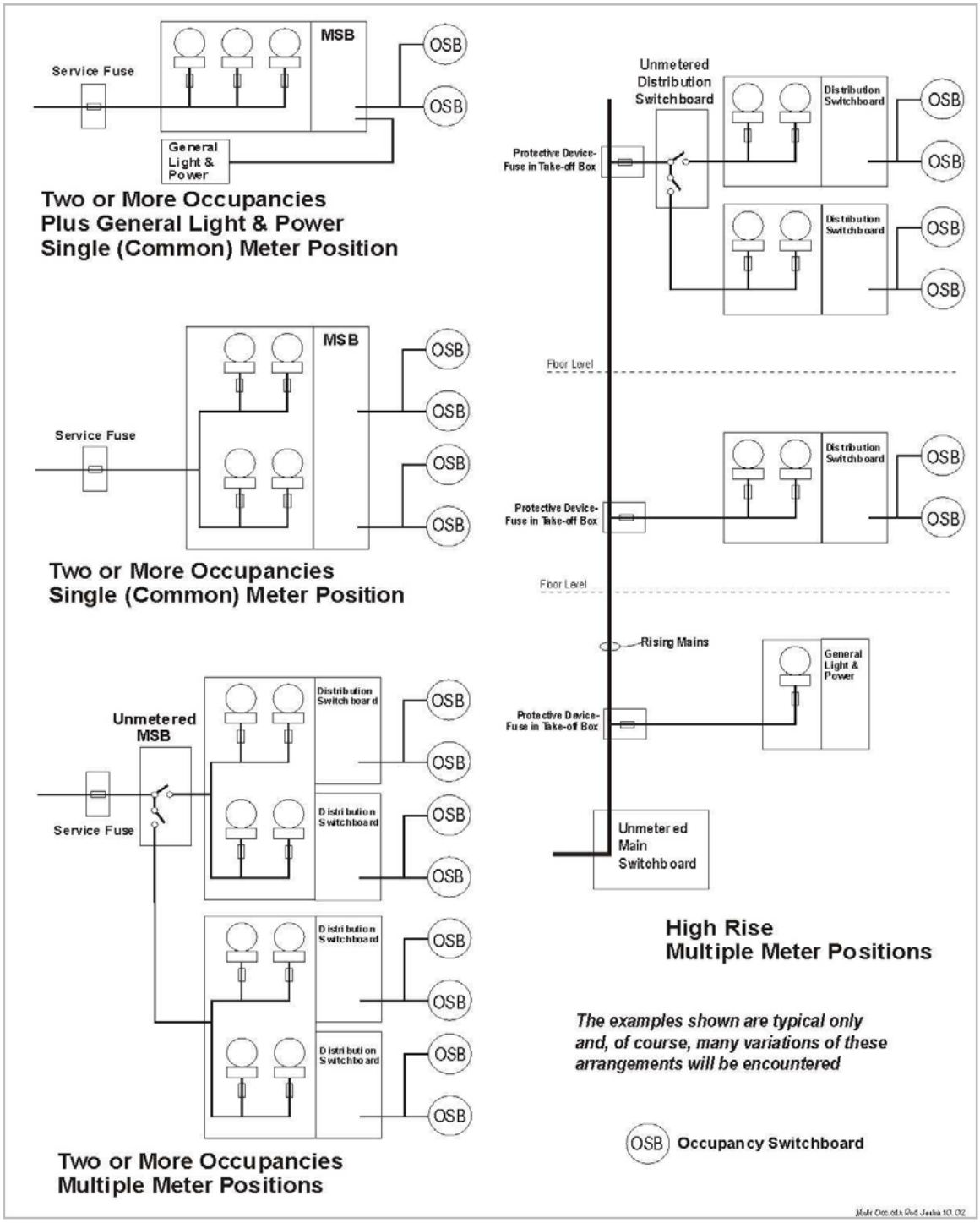
Occupancy Switch Board

15. Polarity Test all incoming consumer's mains conductors. * ++
16. NST Test consumer's mains incoming neutral. * ++
17. Connect consumer's mains incoming neutral conductor.
18. Conduct final NST to occupancy neutral bar
19. Phase Sequence Test (3 phase only). *
20. Program meters and time switch.
21. Load tests. *
22. Equipment functionality test.
23. Check all connections and equipment.
24. Seal equipment in accordance with Distributors procedures.
25. Leave "ON" or "OFF" in accordance with Distributors procedures.
26. Secure de-energised, un-metered submains, meter panels and individual occupancy meters against unauthorised energisation by use of locks/seals / warning labels/dummy cartridges in accordance with Distributors procedures.

* Refer to individual testing procedures

++ Refer to Appendix (section 5.2) should independent earth not be available for tests

4.8.4 Typical Layouts for Multiple Occupancies - Direct Metered

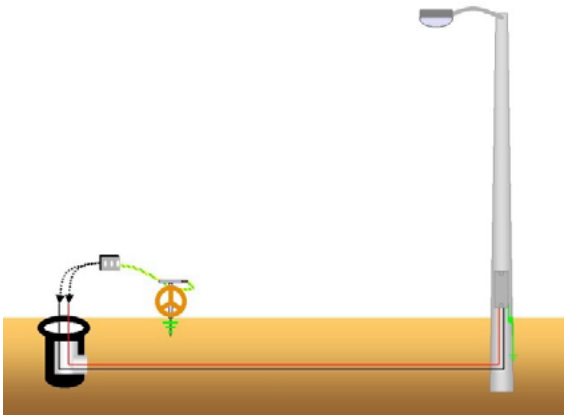


4.9 New Installation Public Lighting - With Switchboard

Typical Arrangement of Lighting Column

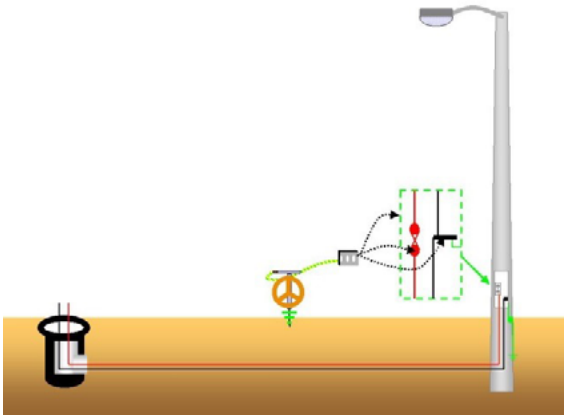
Preliminary Site Checks

1. Visually check for alternative supplies.
2. Check for supply availability
3. At the Supply End test lighting service conductors for de-energised. *

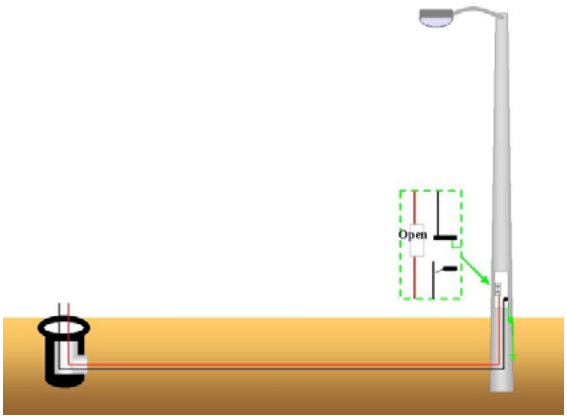


Lighting Column End/s

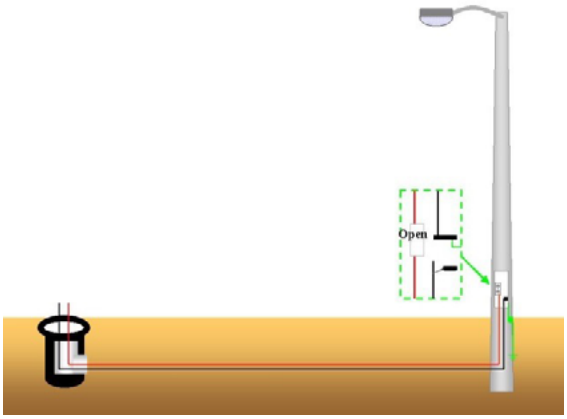
4. Test for de-energised *
5. Install “Installation Under Test” notice.



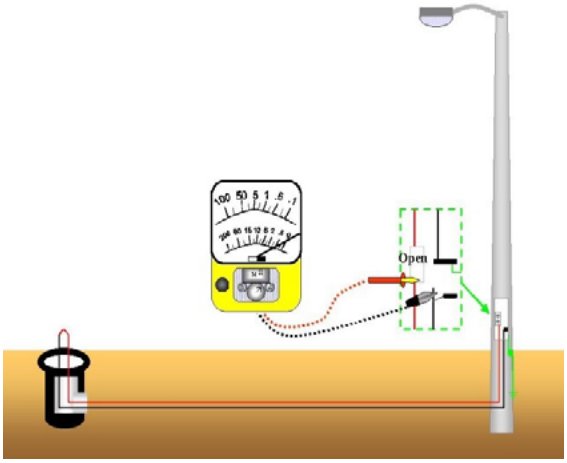
6. Identify lighting incoming service conductors and lantern supply conductors.
7. Visually check MEN terminal block, earth stud and earth rod connections are completed.
8. Test continuity between the MEN terminal block and column to ensure less than **0.5 Ω** resistance.



9. Ensure lantern fitting/s and associated wiring is complete.
10. Ensure incoming supply active is appropriately isolated.

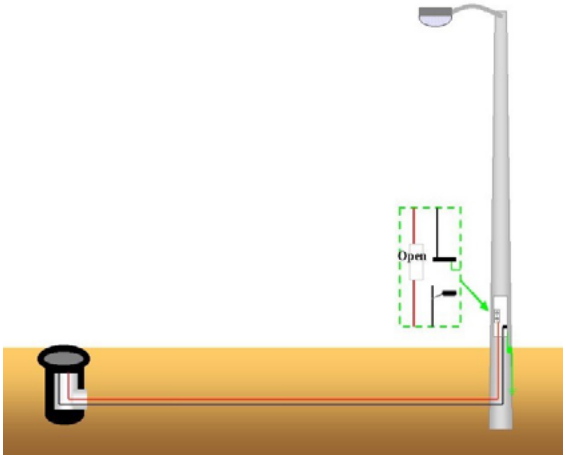


11. Tag the incoming lighting service neutral and ensure incoming neutral is disconnected and made safe.
12. Conduct Underground Consumers Mains Test on the lighting service conductors. *



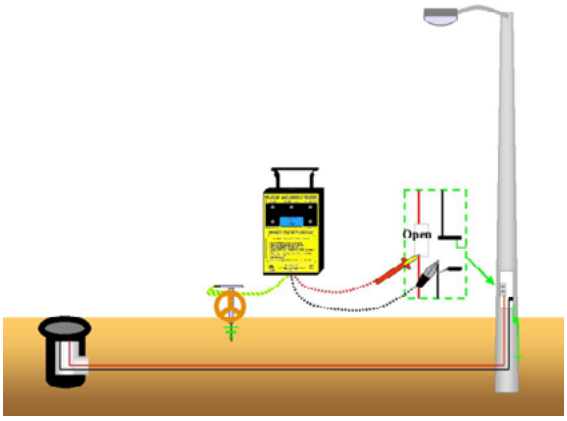
Supply End

13. Identify and tag lighting mains neutral and supply neutral conductors and connect.
14. Identify lighting mains active and supply active conductors and connect.

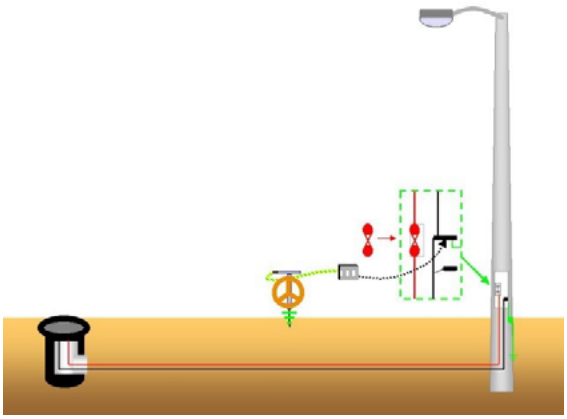


Lighting Column End/s

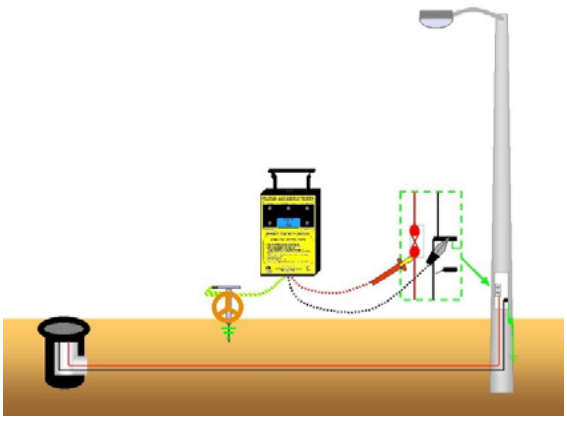
15. Polarity Test lighting service conductors. *
16. NST Test lighting service conductors. *



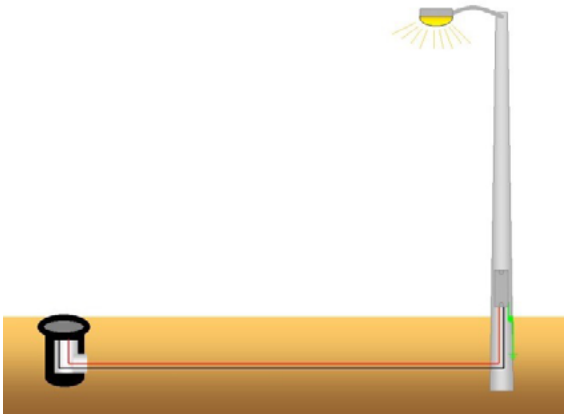
17. Connect service neutral to MEN terminal block.
18. Check Test to MEN terminal block. *



19. NST Test to lantern column. *



20. Test lantern/s operation.
21. Check all connections and equipment
22. Close and secure lighting column cover.



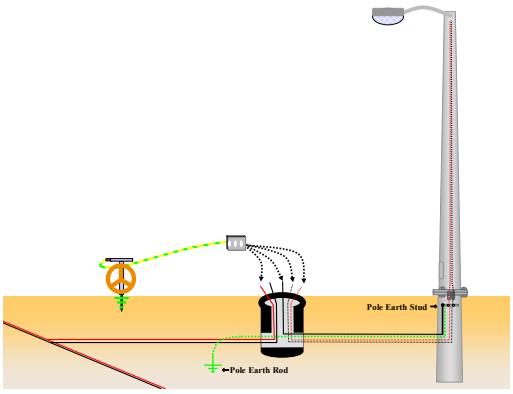
* Refer to individual test procedures.

4.9.1 New Installation Public Lighting- Without Switchboard (Frangible Column)

Typical Arrangement slip base / frangible column demonstrated

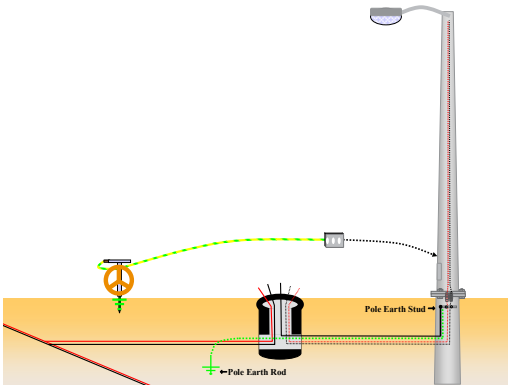
Preliminary Site Checks

1. Visually check for alternative supplies.
2. Check for supply availability
3. At the Supply End test lighting service conductors for de-energised. *

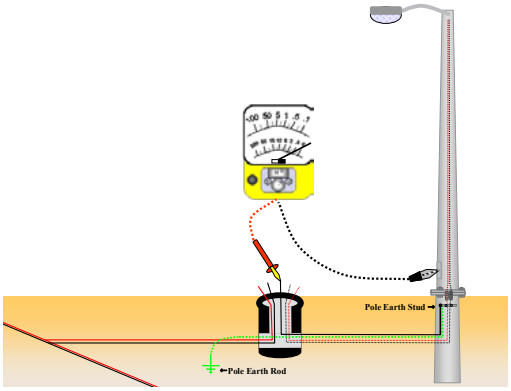


Lighting Column End

4. Test for de-energised.*
5. Install Installation Under Test notice.
6. Ensure pole installation, earthed neutral, earth electrode and associated lantern wiring is complete in accordance with Technical Standards.



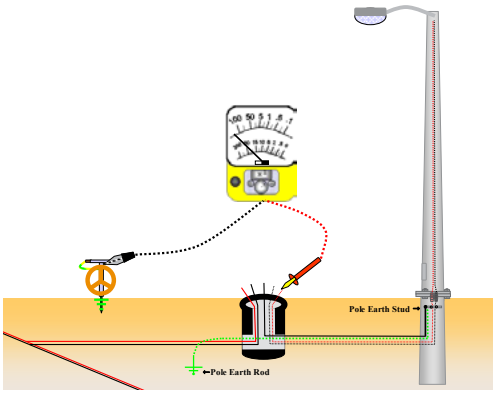
7. Test continuity between the earthed neutral conductor at the pit and the column and ensure less than **0.5 Ω** resistance.



Pit End

8. Test insulation resistance of lantern supply cables to earth. Confirm value of test results and what is expected.

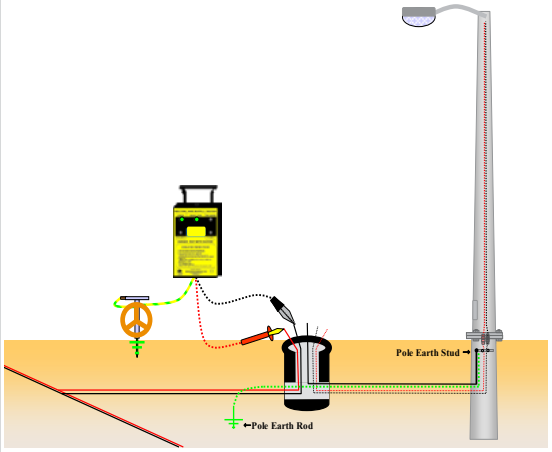
   Electronic equipment, such as LED light heads, may be damaged during testing. It is recommended to disconnect the LED light head, where possible, before conducting the Insulation Resistance Test between live and earth parts on the Public Light circuit. Where this is not practical, the alternative option provided is acceptable:



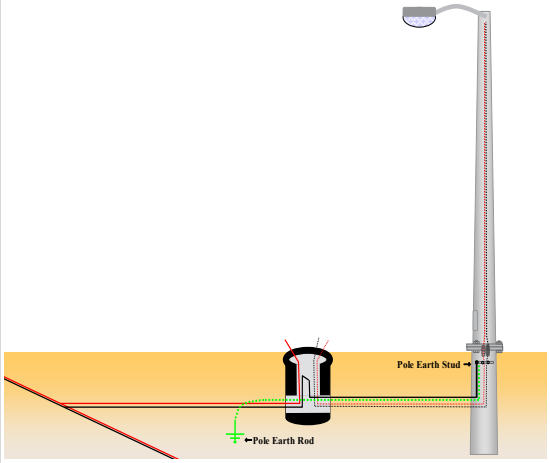
   a. **Light Head Disconnected** – (preferred): The Insulation Resistance shall not be less than 50 megohms.
   b. **Light Head Connected** – (alternative): Reduce the Insulation Resistance test voltage for the public light circuit to **250V DC**.

   The Insulation Resistance shall not be less than **1 megohm**

9. Polarity Test the supply conductors.
10. NST Test the supply conductors. *

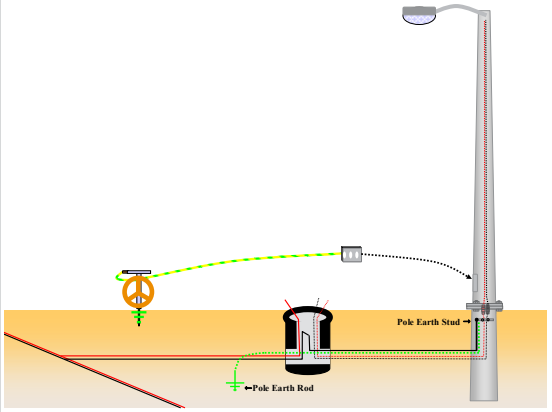


11. Identify and tag the 16 mm earthed neutral conductor from the column and the mains supply neutral conductor and connect.



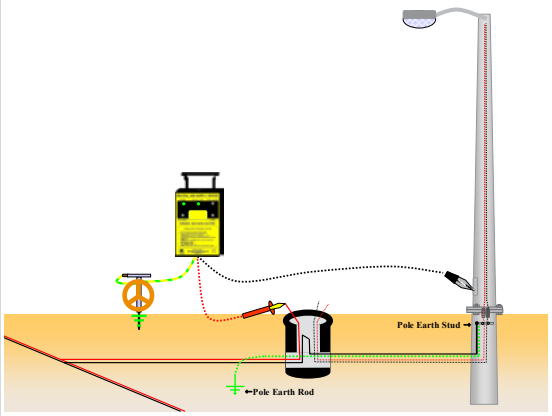
Lighting Column End

12. Test the pole for de-energised. *



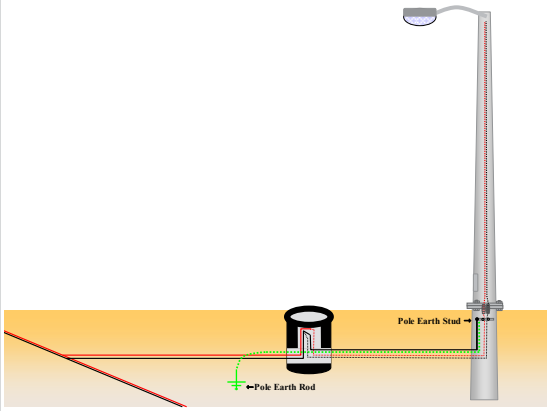
13. Conduct NST Test on the pole/earthing system. *

Note: Supply for the NST tester will be required to be taken from the pit for this test.



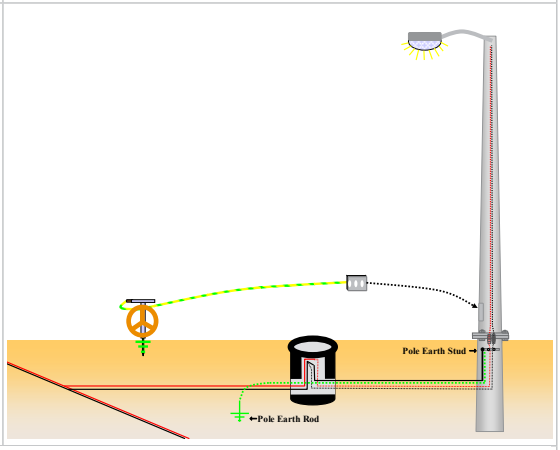
Pit End

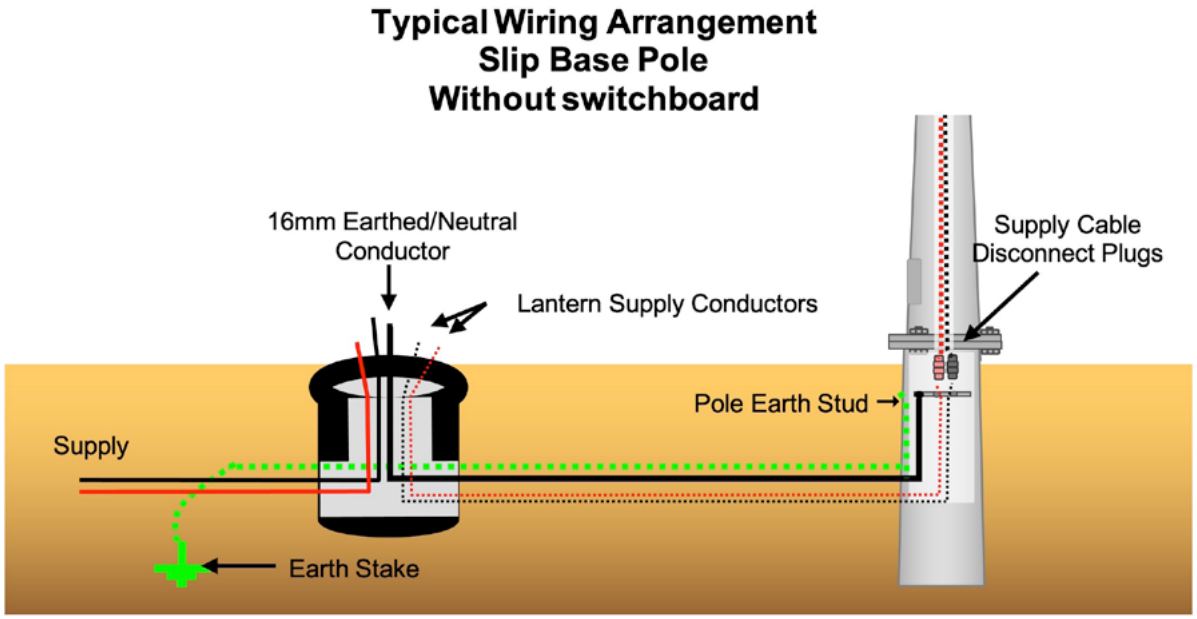
14. Identify and tag the lantern supply and mains supply neutral conductors and connect.
15. Identify the lantern supply and mains supply active conductors, install fuse assembly and connect.



Lighting Column End

16. Test the column for de-energised.*
17. Check the lantern/s operation.
18. Check all connections and equipment.
19. Close and secure terminal covers.





* Refer to individual test procedures.

4.10 New Installation Public Lighting - With Customer/s Supply

4.10.1 Introduction

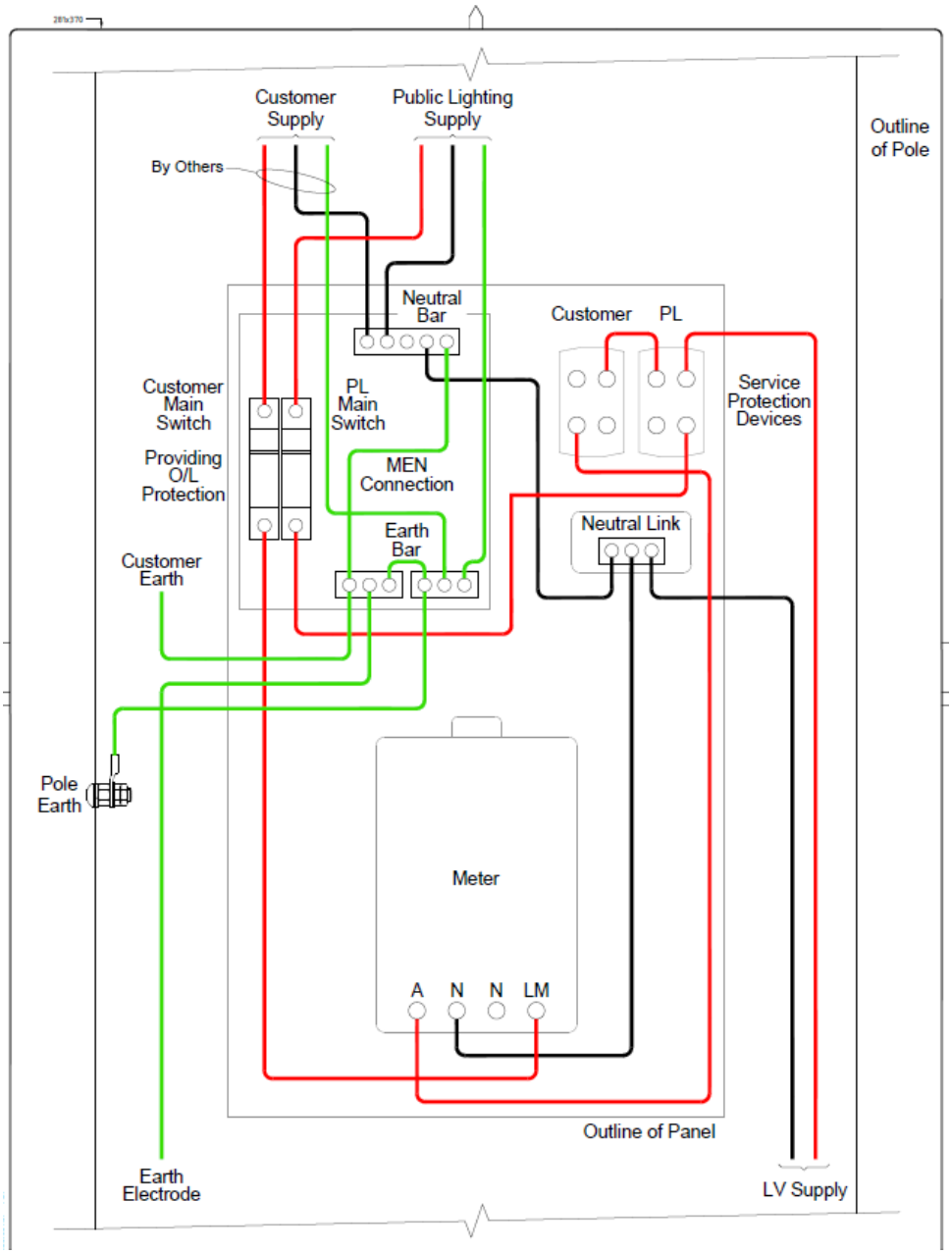
This procedure/information is for educational purposes and will be developed in the future.

The arrangement is a combination of a public light combined with a metered supply for telecommunication equipment.

Refer to distribution procedure/process for the wiring and testing of the installation.

The task will require the combination of Lineworkers to install the pole and wire the public light. Will require the telecommunication REC to connect to the point of supply.

> **Note** A combination of testing will be required for this installation. Un-metered Public light supply, will require procedure 4.9 and Network LEI for metered supply installation testing.

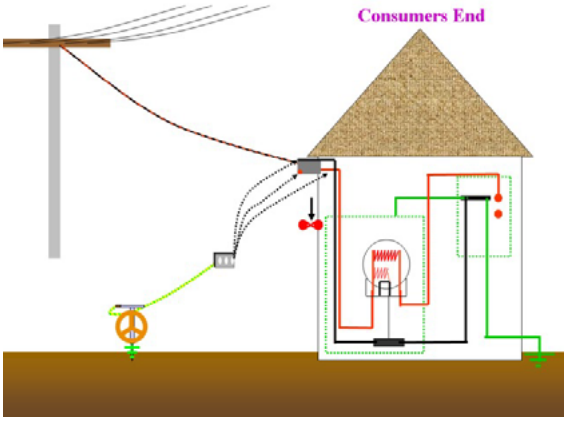


4.11 Existing Installation Replacement or Disconnection & Reconnection Overhead Service - Service Cable “On-supply”

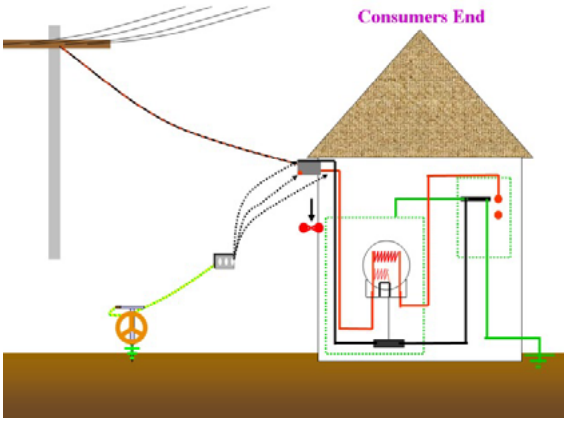
Note: **This procedure applies to the replacement or disconnection and reconnection of an existing overhead service which was on supply prior to the commencement of work.**

Consumers End

1. Test work area for de-energised*
2. Remove service fuse/s. (Refer Note 1)
3. Identify existing active and neutral connections/conductors and mark/ tag consumer’s mains neutral where appropriate. (Refer Section 2.6).

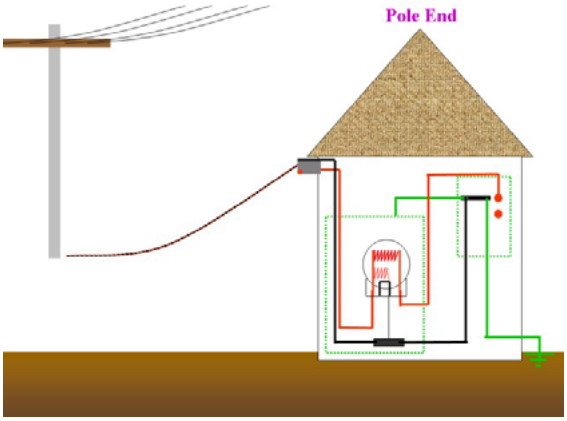


4. (3 Phase Only) Identify existing service cable phase sequence and mark sequence on corresponding consumers mains. *
5. Test for de-energised, consumer’s mains. *



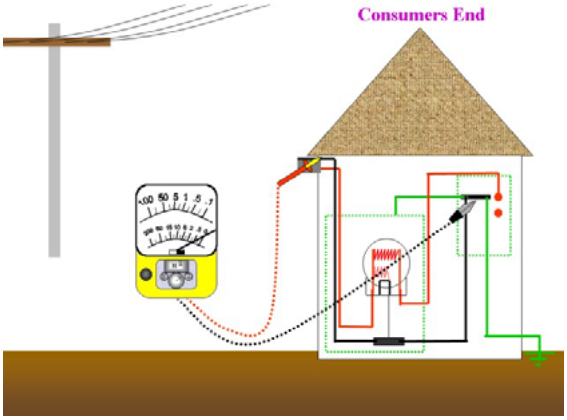
Pole End

6. Identify supply neutral and mark/tag.
7. Disconnect service active/s conductor/s.
8. Disconnect service neutral conductor and lower existing service.



Servicing – Consumer's End

9. Remove existing service cable (if applicable)
10. Establish Neutral Integrity Test Point. * (++)



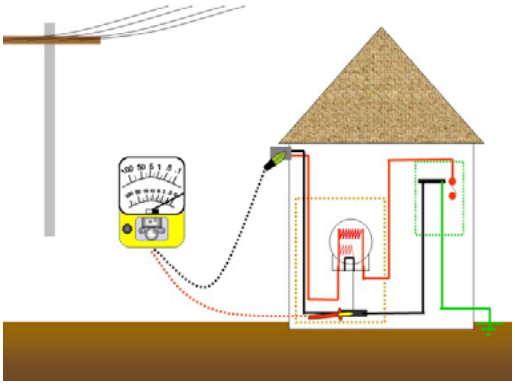
++ Method for establishing alternative NITP, where the normal NITP are not accessible.

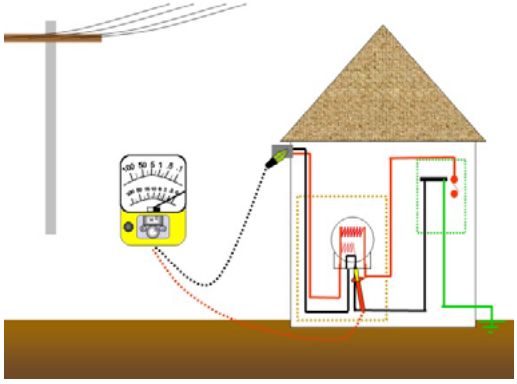
This variation is only permitted for service replacement procedures where the service protection device is at the load end.

Where the 3 normal NITPs are inaccessible in replacement overhead procedures (service protection device – load end), the connector may substitute the NITP test with a continuity test between the point of supply and the outgoing neutral at the customers metering position as demonstrated below.

The maximum allowable test result is 0.5 ohm.

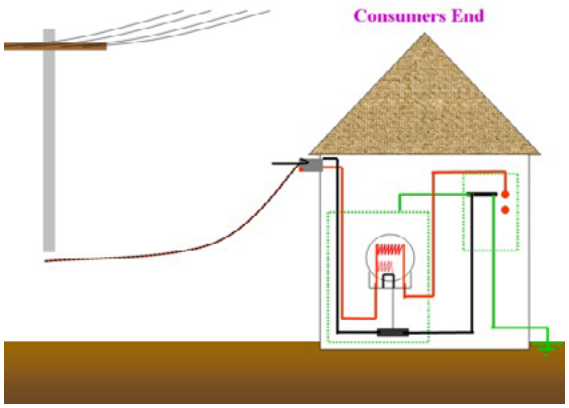
Neutral Link on Meter panel/board OR Outgoing Neutral on a ANNA connected Meter.





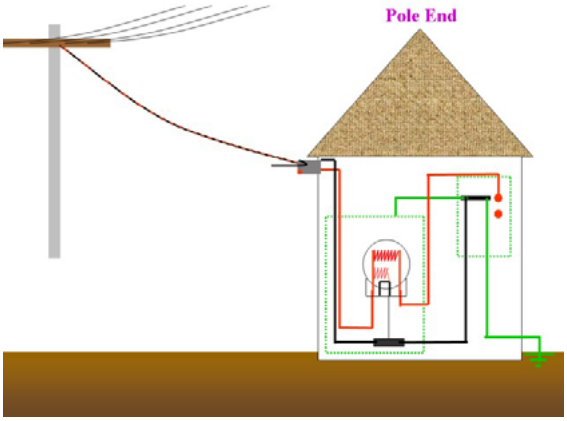
After establishing suitable continuity the outgoing neutral at the meter position may be used in substitution of the NITP for the purpose of this procedure.

11. Erect new service cable (if applicable).
12. Visually identify and tag service neutral.
13. Identify and connect active service conductor/s to line side of fuse terminal/s.
14. Ensure service neutral is disconnected and made safe.



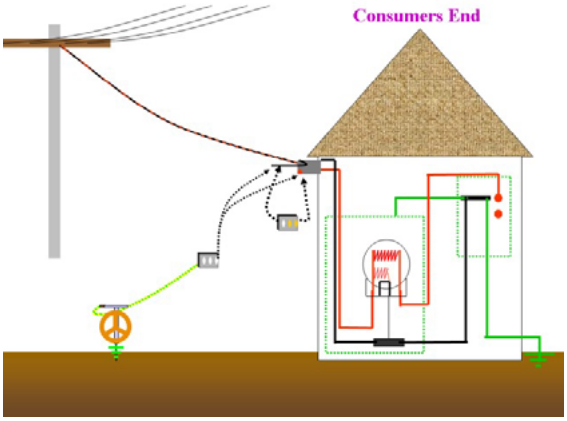
Servicing – Pole End

15. Raise service cable.
16. Visually identify service and supply neutral conductors, tag as appropriate and connect.
17. Identify and connect active service conductors to the appropriate active mains.

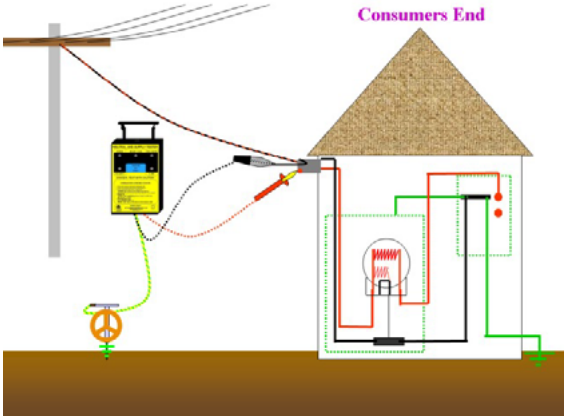


Servicing – Consumers End

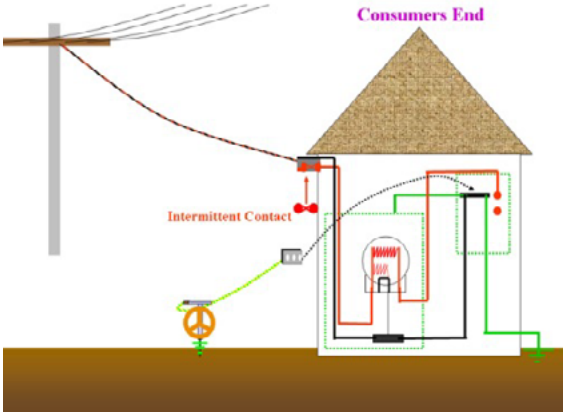
18. Polarity Test service cable conductors.*

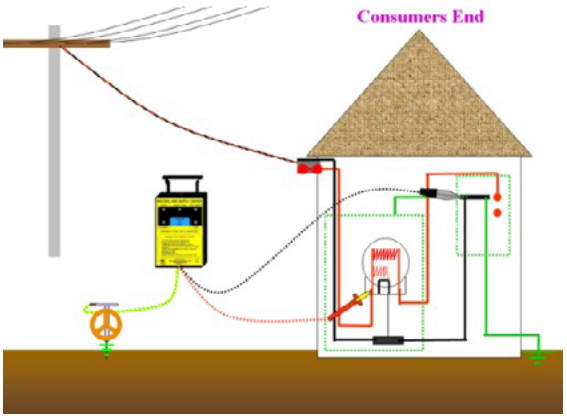


19. NST Test service cable conductors.*



20. Connect Service Neutral to Consumers Mains Neutral.
21. Ensure phase sequence corresponds with phase sequence prior to disconnection. *
22. Check Test.*
23. Leave service fuse/s inserted.



24. NST to Neutral Integrity Test Point. *	

* Refer to individual test procedures.

++ Where NITP is not accessible, refer to method for establishing alternative NITP in diagrams at step 10

Note 1 Where the service fuse has not been removed prior to disconnecting the service at the pole end, other precautions should be undertaken due to possible embedded generation. Precautions like; Isolate main switch/s and test for de-energised. If possible isolate embedded generation inverter switch, or disconnect service, treat any exposed parts as alive until tested as de-energised and suitably insulated (IPC, insulated connector, cap).

4.11.1 Existing Installation Replacement or Disconnection & Reconnection Underground Consumer's Mains up to 100A, Single Occupancy Supplied from a Pit - Service cable "On or Off Supply"

This procedure applies to a typical URD scenario with Service Protection Devices (SPDs) at the meter position.

For other scenarios with differing disconnection points (e.g., pillar, pole) or remote SPDs, individual Distributor requirements and the General Principles outlined in Section 4.2 of this Manual shall be followed.

4.11.1.1 Disconnection

Meter Position

1. Test work area for de-energised.*
2. Remove service fuse/s
3. Install installation under test notices
4. (3 Phase Only) Identify existing phase sequence and record. (Refer Note 1)

Pit

5. Identify appropriate consumer's mains cables for disconnection
6. Disconnect consumers mains active/s then neutral
7. Test for de-energised, consumer's mains *

Meter Position

8. Test for de-energised, consumer's mains *

4.11.1.2 Reconnection

Preliminary Site Checks

9. Visually check for alternative supplies

Meter Position

10. Test for de-energised. *
11. Ensure service fuse wedges and other meter panel fuse wedges are left out.
12. Install “Installation Under Test” notice/s.
13. Identify the consumer’s incoming mains neutral and ensure it is disconnected and made safe.
14. Establish Neutral Integrity Test Point. *
15. Ensure consumer’s mains are accessible in pit and separated in preparation for consumer mains test.
16. Conduct Underground Consumers Mains Test. * (Refer Note 2)

Pit

17. Test for de-energised consumer’s mains. *
18. Identify and tag consumer’s mains and supply neutral conductors and connect.
19. Identify and connect service active/s with appropriate mains active/s.

Meter Position

20. Polarity Test consumer’s mains conductors. *
21. NST consumer’s mains conductors. *
22. Reconnect consumer’s mains incoming neutral conductor.
23. Check Test/s. *
24. Leave service fuse/s inserted.
25. NST Test to Neutral Integrity Test Point. *
26. Phase Sequence Test (3 Phase only) * (Refer Note 1)
27. Seal Equipment.

* Refer to individual test procedures

Note 1 - Where the installation is off supply prior to commencing work, refer to Section 3.9, Phase Sequence Test, notes section b).

Note 2 – Where the consumer’s mains are completely replaced, the Insulation Resistance (IR) test result shall be the same as a new connection. (i.e. **50 megohms** – Refer Connection Procedure 4.5 and Underground Consumer’s Mains Test Procedure 3.4)

For reconnection of existing mains or repaired mains, the IR test result shall be a minimum of **1 megohm**. Where this value cannot be obtained, refer to individual Distributor Procedures.

IR test (step 16) required when customers mains are disconnected from the DB’s pole i.e., pole replacement work. IR test is not mandatory where pole to pit has been disconnected.

4.11.2 Existing Installation Replacement or Disconnection & Reconnection Underground Consumer's Mains up to 100A, Multiple Occupancy Supplied from a Pit - Service cable "On or Off Supply"

This procedure applies to a typical Multiple Occupancy supplied from a URD with Service Protection Devices (SPDs) at the group meter position and the main neutral directly connected to the neutral bar at the customer's main switchboard.

Where each occupancy is individually metered with an SPD or SPDs at each individual meter position, refer to procedure 4.11.1 (i.e., Testing as per single occupancy)

For other scenarios with differing wiring arrangements, individual Distributor requirements and the General Principles outlined in Section 4.2 of this Manual shall be followed:

4.11.2.1 Disconnection

Meter Position

1. Test work area for de-energised.*
2. Ensure all main switches are in the Off position
3. Remove service fuse/s
4. Install installation under test notices
5. (3 Phase Only) Identify existing phase sequence and record. (Refer Note 1)

Pit

6. Identify appropriate consumer's mains cables for disconnection
7. Disconnect consumer's mains actives then neutral
8. Test for de-energised, consumer's mains *

Meter Position

9. Test for de-energised, consumer's mains *

4.11.2.2 Reconnection

Preliminary Site Checks

10. Visually check for alternative supplies

Meter Position

11. Test for de-energised. *
12. Confirm all main switches are in the Off position
13. Confirm service fuses from SPDs (incoming supply) are removed.
14. Install "Installation Under Test" notice/s.
15. Identify the consumer's incoming mains neutral (customer switchboard) and ensure it is disconnected and made safe.
16. Visually confirm MEN connection point as the NITP. *
17. Conduct Underground Consumer's Mains Test. * (Refer Note 2)

Pit

18. Test for de-energised consumer's mains. *
19. Identify and tag consumer's mains and supply neutral conductors and connect.
20. Identify and connect service active/s with appropriate mains active/s.

Meter Position

21. Polarity Test consumer's mains conductors. *
22. NST incoming customer's neutral. *

23. Connect consumer's mains incoming neutral conductor (customer switchboard).
24. Check Test/s. *
25. Leave service fuse/s inserted.
26. NST Test to Neutral Integrity Test Point. *
27. Phase Sequence Test (3 Phase only) * (Refer Note 1)
28. Ensure all main switches are returned to original position
29. Seal Equipment.

* Refer to individual test procedures

Note 1 - Where the installation is off supply prior to commencing work, refer to Section 3.9, Phase Sequence Test, notes section b).

Note 2 – Where the consumer's mains are completely replaced, the Insulation Resistance (IR) test result shall be the same as a new connection. (i.e. **50 megohms** – Refer Connection Procedure 4.5 and Underground Consumer's Mains Test Procedure 3.4)

For reconnection of existing mains or repaired mains, the IR test result shall be a minimum of **1 megohms**. Where this value cannot be obtained, refer to individual Distributor Procedures.

4.11.3 Existing Installation Replacement or Disconnection & Reconnection Underground Service Greater than 100A, Single or Multiple Occupancy

Introduction

The performance of this connection procedure shall only be undertaken by personnel approved by the relevant network operator to undertake the task. Completion of this procedure may require a combination of Lineworkers, Network LEI and Metering Technicians. Personnel undertaking this procedure are to work in conjunction (where required) to ensure all applicable testing is completed as per this procedure.

4.11.3.1 Testing Principles and Definitions:

Supply Point

The Distributors Supply Point is the first point where supply is available upstream of a Point to be connected. The Supply Point will vary dependent upon the installation arrangement and may be the Substation terminals, Distributor pit, pillar, Fused Switch Disconnector (FSD), POA, etc.

Point to be Disconnected and Reconnected

The point to be disconnected and reconnected is the first point downstream of the Supply Point where the neutral or MEN is required to be lifted for the purpose of Polarity and NST testing, e.g., Customer pillar, cubicle, main switchboard, Distribution switchboard, common meter position or meter position.

Main Neutral unable to be disconnected

Refer Note 1 below.

4.11.3.2 Disconnection

Point to be Disconnected

1. Test work area for de-energised.* ++
2. Ensure all mains switches are in the Off position

3. Remove service fuse/s (Where applicable)
4. Install installation under test notices
5. Identify existing service cable phase sequence and record. (Refer Note 2)

Supply Point

6. Identify appropriate supply conductors/cables for disconnection
7. Disconnect supply conductors/cables and make safe
8. Test for de-energised, supply conductors/cables * ++

Point to be Disconnected

9. Test for de-energised * ++

4.11.3.3 Reconnection

Preliminary Site Checks

10. Visually check for alternative supplies.

Point to be Reconnected

11. Test for de-energised.* ++
12. Ensure main switches are in the Off position and service protection devices (e.g., circuit breaker/fuses) are open/removed where applicable.
13. Ensure metering, equipment and associated wiring is complete as appropriate.
14. Remove voltage fuses from CT chamber where applicable.
15. Remove fuses of ancillary equipment upstream of the main switches where applicable (Refer Note 1)
16. Identify incoming active conductors.
17. Identify main neutral conductor and disconnect from main neutral bar/MEN and make safe. (Refer Note 1)
18. Perform an IR Test of the consumer's mains conductors. * (Refer Note 3).

Supply Point

19. Visually identify mark/tag the supply neutral and connect.
20. Visually identify the supply active conductors and connect.
21. Energise the point to be connected.

Point to be Reconnected

22. Polarity Test consumer's mains conductors. *++
23. NST incoming customers neutral. *++
24. De-energise supply conductors. (Refer Note 4 where installation is supplied by an underground mains tee joint).
25. Reconnect main neutral conductor to the main neutral bar/MEN point. (Refer Note 1 where main neutral was unable to be disconnected).
26. Restore fuses of ancillary equipment upstream of the main switches where applicable
27. Restore CT metering fuses where applicable.
28. Re-energise supply conductors (Refer Note 4 for mains tee joint).
29. Final NST Test to MEN bar/neutral bar. *++ (Refer Note 1 where main neutral was unable to be disconnected)
30. Phase Sequence Test to confirm original Phase Sequence.* (Refer Note 2).
31. Confirm CT Metering is recording consumption where applicable
32. Fit Locks/Seals where applicable

* Refer to individual testing procedures

++ Refer to Appendix (section 5.2) should independent earth not be available for tests

Notes

Note 1 - Neutral Unable to be Disconnected

Due to multiple large conductors in parallel, the conductor size or complex installations with multiple sets of ancillary equipment upstream of the main switch/s, it may be impractical to disconnect the service neutral at the customer's main neutral bar.

Where it is deemed impractical, the above procedure remains effective with the following exceptions:

- Step 17 The MEN link shall be removed by a licensed electrician instead of disconnecting the main neutral from the main neutral bar/MEN point.
- Step 18 Conduct insulation resistance test of the consumer's mains active conductors.
- Step 25 Reconnect the MEN link
- Step 29 Final NST Test conducted to a known earthing point downstream of the MEN Link connection.*++

Note 2 - Where the installation is off supply prior to commencing work, refer to Section 3.9, Phase Sequence Test, notes section b).

Note 3 - Where consumer's mains are completely replaced, the Insulation Resistance (IR) test result shall be the same as a new connection. (i.e. **50 megohms** – Refer Connection Procedure 4.5 and Underground Consumer's Mains Test Procedure 3.4.

For reconnection of existing mains or repaired mains, the IR test result shall be a minimum of **1 megohm**. Where this value cannot be obtained, refer to individual Distributor Procedures.

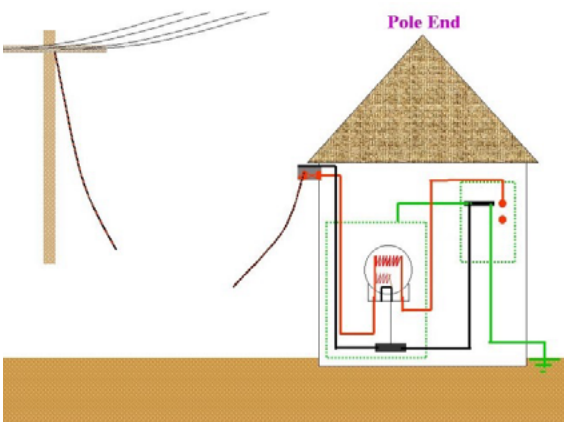
Note 4 - Where the Supply Point for the installation is an underground mains tee joint, disconnection of supply to allow reconnection of the main neutral may be impractical. In these cases, live LV techniques are to be followed as per the individual Distributor requirements to allow reconnection of the main neutral.

4.12 Existing Overhead Service Cable - Service Cable "Disconnected"

NOTE: **This procedure applies when replacing any service cable which has been physically disconnected or broken at any point prior to the commencement of works, i.e., under fault conditions (wire down).**

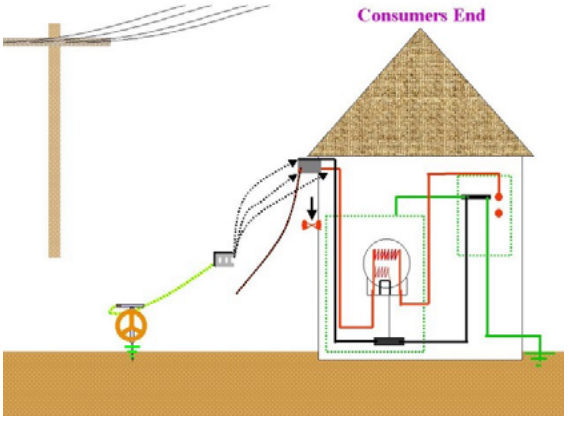
Pole End

1. Identify supply neutral and mark/tag.
2. Disconnect service active conductor/s.
3. Disconnect service neutral conductor and remove existing service.

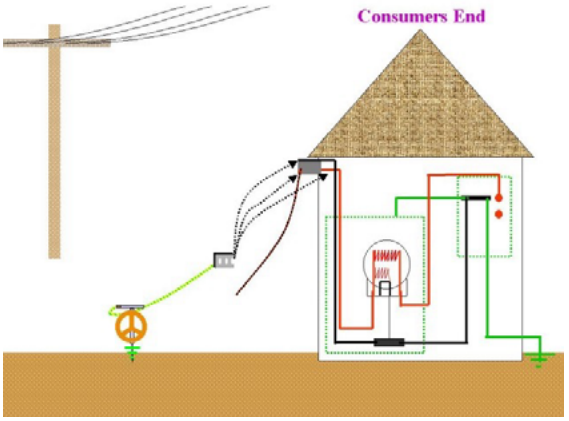


Consumers End

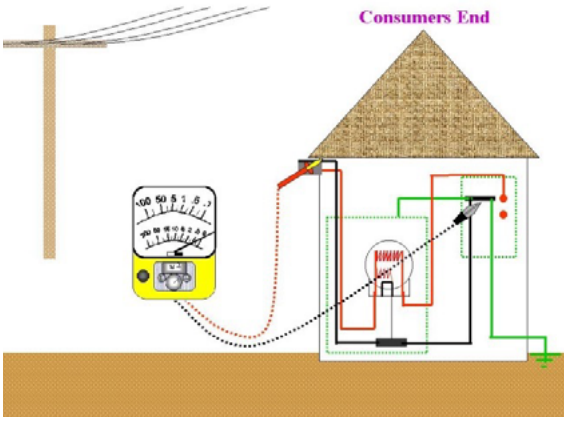
4. Test work area for de-energised. *
5. Remove the service fuse/s.
6. Test for de-energised, consumer's mains. *



7. Visually identify active and neutral connections/conductors and mark/tag consumer's mains neutral as appropriate. (Refer Section 2.6)
8. Disconnect service active/s and neutral and remove existing service.



9. Establish Neutral Integrity Test Point. * ++
10. Check all main switches are "Off", (3 phase only)



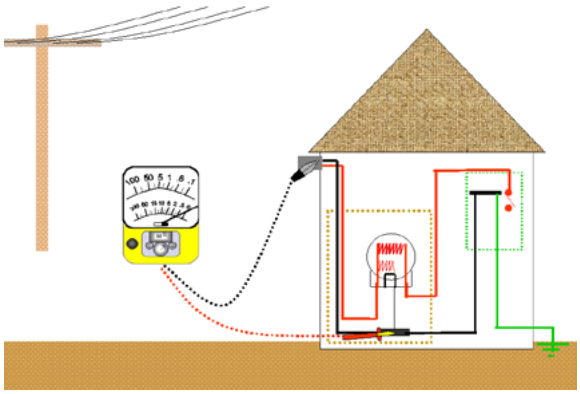
++ Method for establishing alternative NITP, where the normal NITP are not accessible.

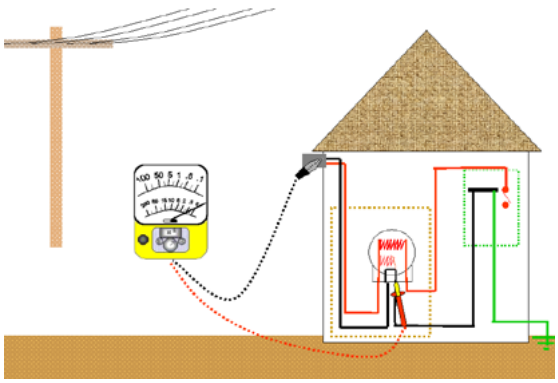
This variation is only permitted for service replacement procedures where the service protection device is at the load end.

Where the 3 normal NITPs are inaccessible in replacement overhead procedures (service protection device – load end), the connector may substitute the NITP test with a continuity test between the point of supply and the outgoing neutral at the customers metering position as demonstrated below.

The maximum allowable test result is **0.5 ohm**.

Neutral Link on Meter panel/board OR Outgoing Neutral on a ANNA connected Meter.

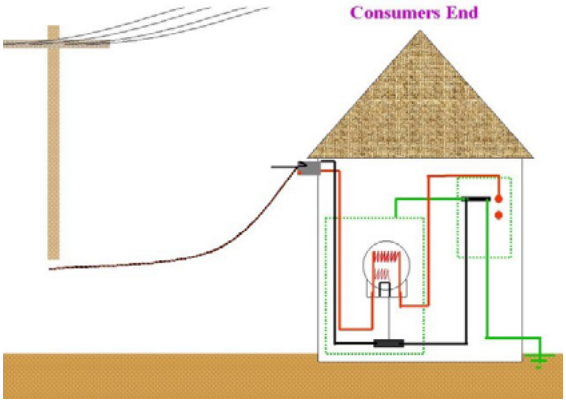




After establishing suitable continuity the outgoing neutral at the meter position may be used in substitution of the NITP for the purpose of this procedure.

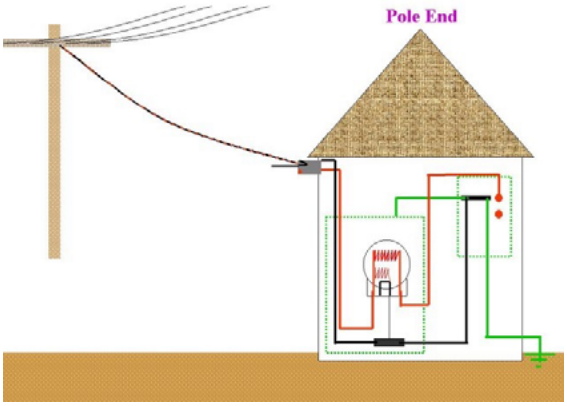
Servicing Consumers End

11. Erect replacement service cable.
12. Visually identify and tag service neutral.
13. Identify and connect active service conductor/s to line side fuse terminals.
14. Ensure service neutral is disconnected and made safe.



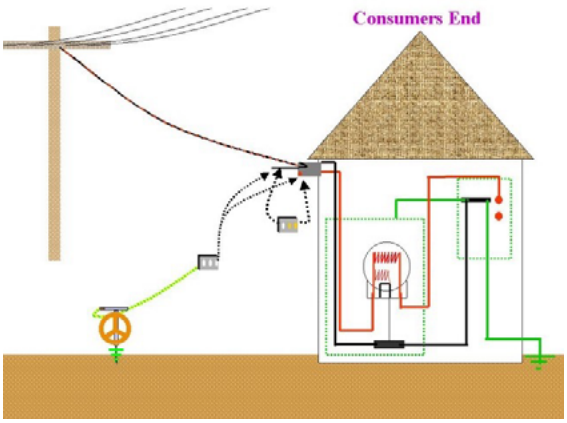
Servicing – Pole End

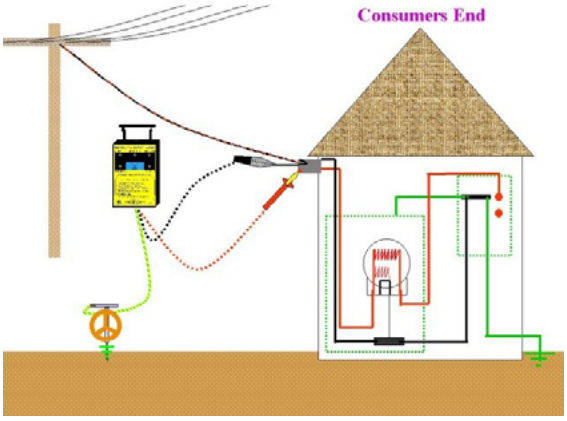
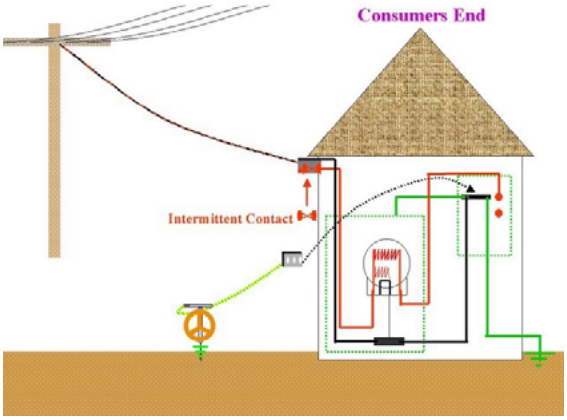
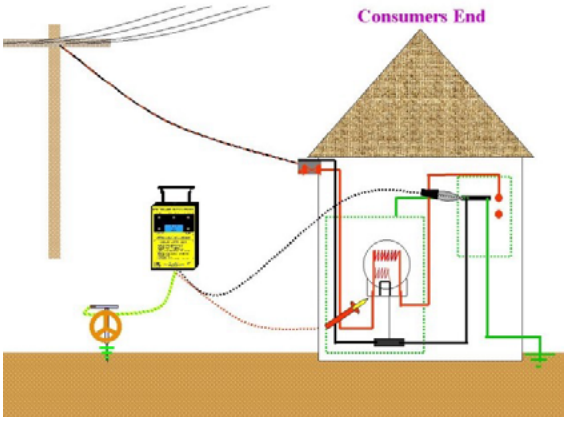
15. Erect service cable.
16. Visually identify service and supply neutral conductors, tag as appropriate and connect.
17. Identify and connect active service conductor/s to the appropriate active mains.



Consumers End

18. Polarity Test service cable conductors. *



19. NST Test service cable conductors. *	
20. Connect Service Neutral to Consumer's Mains Neutral. 21. Check Test * 22. Leave service fuse/s inserted. 23. Ensure original phase sequence returned. (3 phase only) *	
24. NST to Neutral Integrity Test Point. * 25. Leave "On" or "Off" in accordance with Distributors Procedures.	
* Refer to individual test procedures. ++ Where NITP is not accessible, refer to alternative test arrangements -diagrams at step 9	

4.13 Existing Installation Overhead Service Replacement - Service Protection Device Pole End

In these situations, the preferred option is to retire the service protection device from the pole end and install a FOLCB or FSD upstream of the consumers terminals at the POA and undertake service replacement as per VESI testing procedure 4.11 (service replacement on supply) or 4.12 (service replacement supply disconnected) as applicable.

Where a FOLCB or FSD is unable to be installed at the POA and disconnection of the neutral is required to be undertaken at the customer's switchboard, an Network LEI or person approved by the individual Distributor is required to conduct the testing using the procedure below as a guide.

Examples where the FOLCB or FSD would not be able to be installed at the POA include no suitable location or >100A isolators/fuses at the pole end.

Where the procedure below is used, the service replacement and testing personnel will be required to work in conjunction to complete the procedure.

Main Switchboard

1. Test work area for de-energised *
2. Install "Installation Under Test" notice.
3. Identify the incoming neutral conductor at MEN terminals. (Refer Section 2.6)
4. Identify existing phase sequence.*
5. Confirm and record the orientation of all switches, fuses and individual circuit breakers.
6. Ensure all main switches are in the off position, fuses removed and individual circuit breakers are in the off position.

Point of Attachment

7. Test work area for de-energised.*
8. Identify service active/s and neutral conductor's and mark/tag as appropriate. (Refer section 2.6)

Pole End

9. Identify mains neutral and mark/tag if not previously done.
10. Open service protection device/s, e.g., fuse/s.
11. Test for de-energised load side of service protection device.*
12. Disconnect service active conductors.
13. Disconnect service neutral conductors and remove existing service.

Main Switchboard

14. Test for de-energised *
15. Ensure incoming neutral is disconnected and made safe.

Point of Attachment

16. Erect new service
17. Ensure service neutral is identified and connect to installation neutral.
18. Identify service active conductors and connect to installation active.

Servicing - Pole End

19. Erect service cable.
20. Identify service neutral, mark/tag as appropriate and connect to supply neutral.
21. Identify service active conductors and connect to the appropriate supply actives.
22. Energise service conductors.

Main Switchboard

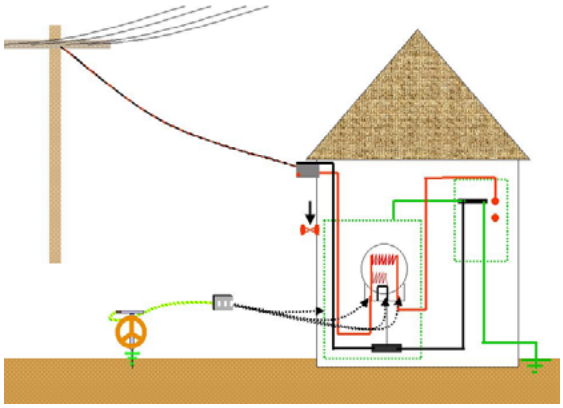
23. Polarity Test incoming supply conductors.*
24. NST Test incoming supply conductors.*
25. Reconnect supply neutral.
26. NST Test to main neutral bar/MEN. *
27. Phase sequence Test.*
28. During the restoration of individual switches, fuses and circuit breakers to their original orientation, conduct check test/s to the main neutral bar/MEN.

* Refer to individual test procedures

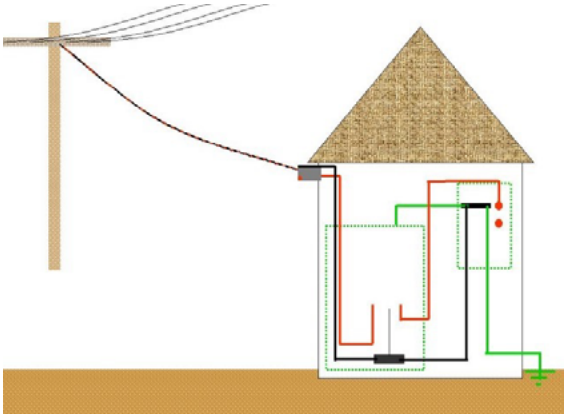
4.14 Existing Installation Single Occupancy Meter Alteration and /or Additions - Direct Metering

Typical Arrangement

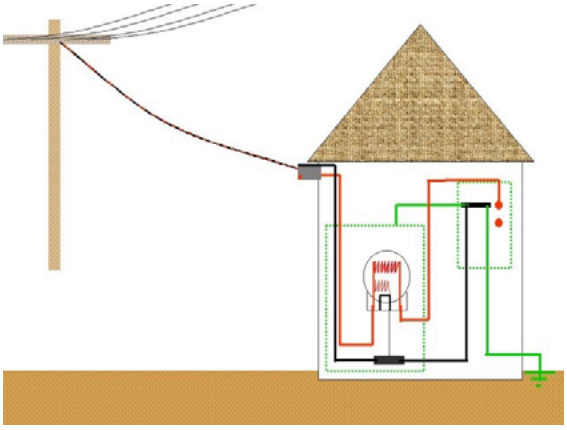
1. Test the work area for de-energised. *
2. Visually confirm NITP availability.
3. Install “Installation Under Test” notice/s.
4. Establish existing phase sequence (3 phase only) *
5. Identify and mark/tag all conductors as appropriate.
6. Remove the service/supply & time switch fuse/s (As applicable)
7. Test for de-energised metering conductors & equipment. *



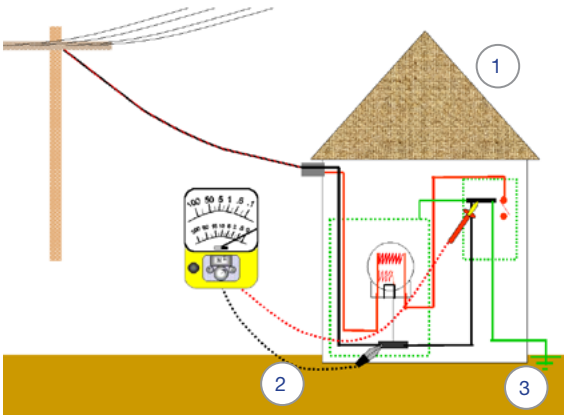
8. Remove meter/s and/or metering equipment and re-test conductors for de-energised (As applicable) *
9. Carry out metering alteration/addition.

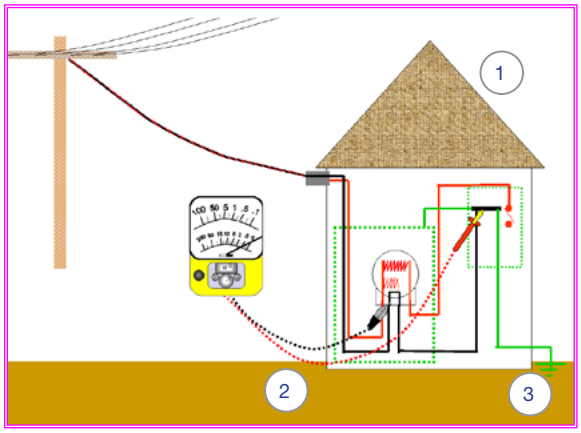
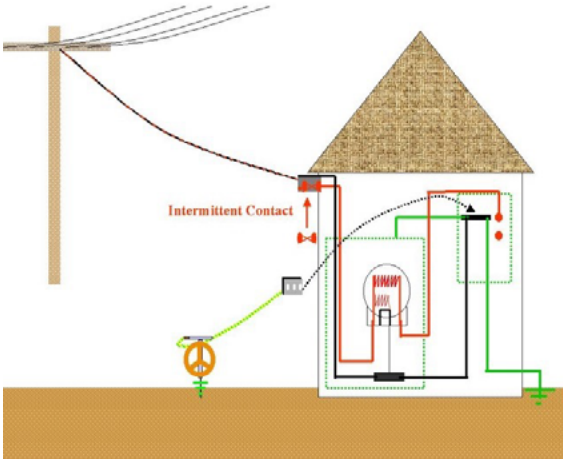
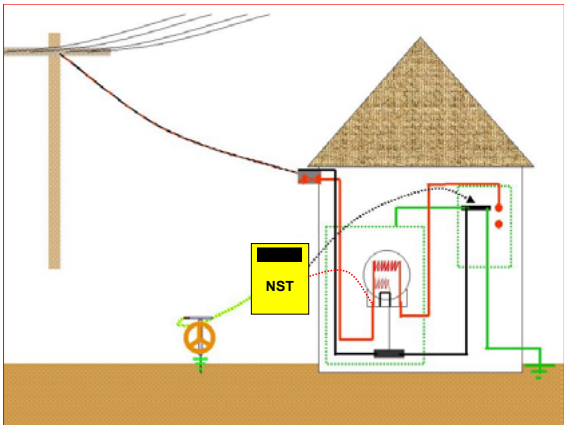
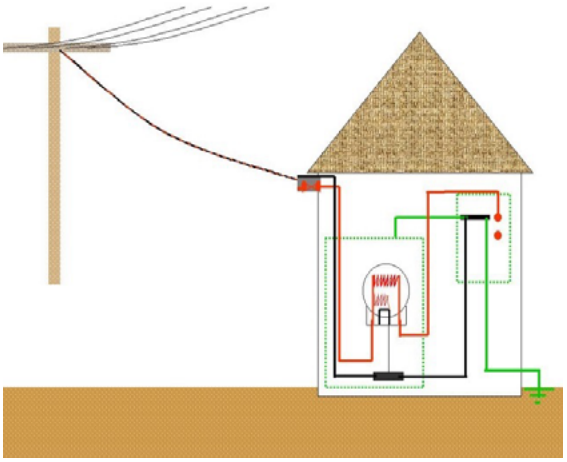


10. Ensure all supply and outgoing conductors are correctly connected



11. Establish Neutral Integrity Test Point.*



11. Establish Neutral Integrity Test Point.* (continued)	
12. Perform Check Test/s. (includes switched circuits) * 13. Leave service/supply fuse/s inserted.	
14. NST to Neutral Integrity Test Point. *	
15. Confirm original phase sequence (3 phase only). * 16. Load test/s. * 17. Equipment functionality tests. 18. Check all connections and equipment. 19. Seal Equipment. 20. Leave “On” or “Off” in accordance with Distributors procedures.	
* Refer to individual testing procedures	

4.14.1 Existing Installation: Multiple Occupancy (MO) Alteration and/or Additions - Direct Metering Main or Occupancy Neutral “Not Disturbed"

(See definition)

This procedure shall be used for MO configurations where the metering is supplied by a single metering neutral conductor and the main neutral conductors are “**not disturbed**” as per the definition:

1. Test the work area for de-energised. * ++
2. Install “Installation Under Test” notice/s.
3. Confirm single metering neutral conductor
4. Visually confirm MEN connection point or neutral bar/link at remote meter board as the NITP.*
5. Establish existing phase sequence (3 phase only). *
6. Identify and mark/tag all conductors as appropriate.
7. Remove the service/supply and time switch fuse/s (As applicable).
8. Test for de-energised metering conductors & equipment. * ++
9. Remove meter/s and/or metering equipment and re-test conductors for de-energised (As applicable)*
10. Carry out metering alteration/addition.
11. Ensure all supply and outgoing conductors are correctly connected.
12. Perform Check Test/s (includes switched circuits) * ++
13. Leave service/supply fuse/s inserted.
14. NST to Neutral Integrity Test Point * ++
15. Confirm original phase sequence. (3 phase only).*
16. Load test. *
17. Equipment functionality tests.
18. Check all connections and equipment.
19. Seal Equipment.
20. Leave “On” or “Off” in accordance with the Distributors procedures.

* Refer to individual test procedures and the following diagrams.

++ **Refer to appendix (section 5.2) should independent earth not be available for tests**

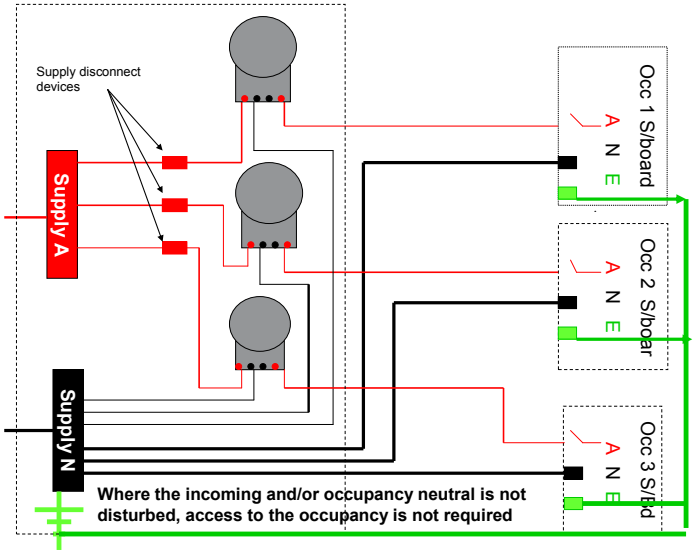
Typical Arrangements

Meter and occupancy neutrals terminated in links at meter position.

- Metering is supplied by single metering neutral conductor.
- Main earth terminated / connected at Meter board supply Neutral Link (MEN).

This MEN link is a valid NITP without further test.

A Neutral bar/link at a meter board remote to the MEN link is also a valid NITP without further test.

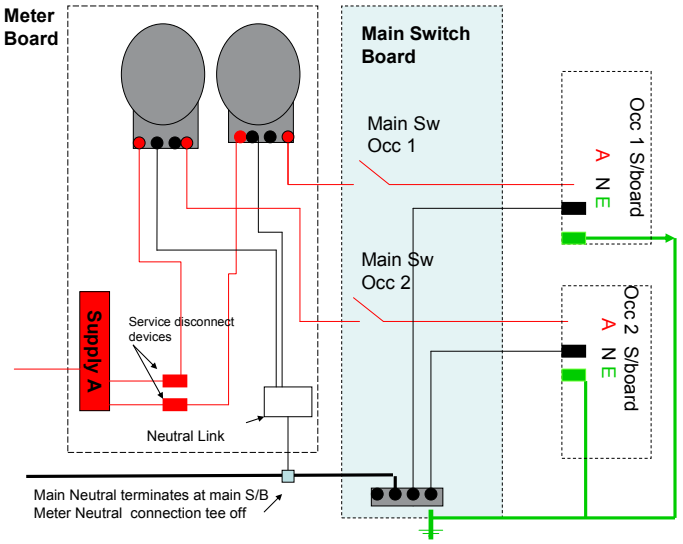


Supply neutral terminated at main switchboard

- Metering is supplied by single metering neutral conductor.
- Main earth terminated / connected at MEN bar on main switchboard

This MEN link is a valid NITP without further test.

A Neutral bar/link at a meter board remote to the MEN link is also a valid NITP without further test.



4.14.2 Existing Installation: Multiple Occupancy (MO) Alteration and/or Additions - Direct Metering Main or Occupancy Neutral "Disturbed"

(See definitions)

This procedure shall be used for MO configurations where the occupancy neutral continues through the meter **and/or** the main neutral conductors are "**disturbed**" as per the definition AND an independent earth can be established at the occupancy switchboard.

At Occupancy

1. Confirm access to switchboard & turn off main switch/s.
2. Visually confirm at switchboard.
   - No MEN ++ -proceed to step 3 or
   - MEN - confirm an independent earth can be established - proceed to step 3 or
   - Where an independent earth cannot be established – **DO NOT CONTINUE**. (Refer to relevant Distributor's procedures and NOTE below)
3. Install "Installation Under Test" notice.
4. Establish existing phase sequence (3 phase only). *

At Meter Position

5. Test the work area for de-energised. * ++
6. Install "Installation Under Test" notice.
7. Identify and mark/tag all conductors as appropriate.
8. Remove the service/supply and time switch fuse/s (As applicable).
9. Test for de-energised metering conductors & equipment. * ++
10. Remove meter/s and/or metering equipment and re-test conductors for de-energised (As applicable). *
11. Install bridge between load active & load neutral at meter position.

At Occupancy

12. Test for de energised *
13. Conduct continuity test between active & neutral Resistance of 0.5 ohm or less validates occupancy switchboard neutral bar as the NITP.

At Meter Position

14. Remove bridge and carry out metering alteration/addition.
15. Ensure all supply and outgoing conductors are correctly connected.

At Occupancy

16. Perform Check Test/s to occupancy neutral bar (includes switched circuits). *++
17. Leave Service /supply fuse/s inserted.
18. Conduct final NST test to occupancy neutral bar. *++
19. Confirm original phase sequence (3 phase only). *
20. Restore occupancy main switch as found.

At Meter position

21. Load test /s.*
22. Equipment functionality tests.
23. Check all connections and equipment.
24. Seal equipment.
25. Leave “On” or “Off” in accordance with the Distributors procedures.

* Refer to individual test procedures and the following diagrams

++ **Refer to appendix (section 5.2) should independent earth not be available for tests**

Note: Where a Multiple Occupancy installation exists with the MEN connected at the occupancy S/board and an independent earth is not available, the procedure in 5.2 does not apply.

These situations will require attendance of appropriately trained/authorised/approved personnel to conduct the testing and connection of affected occupancy/s using relevant Distributor procedures.

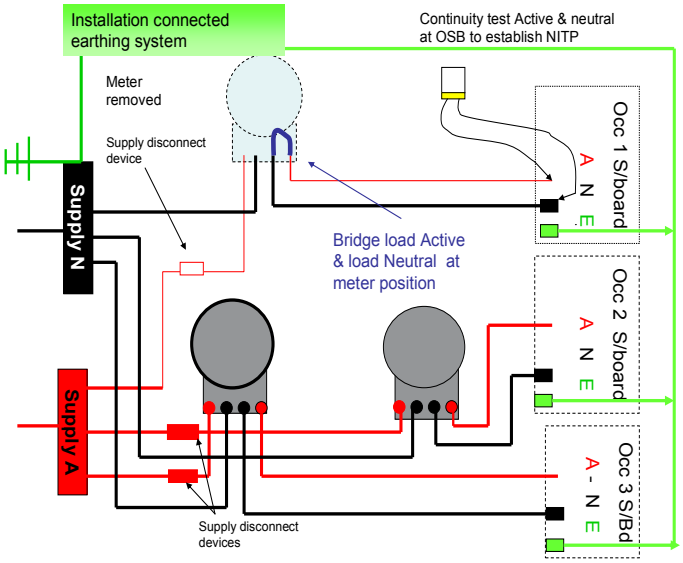
Typical Arrangements

Occupancy Switchboard, Neutral & Earth Bars separated:-

Install bridge between load active & load neutral at Meter position.

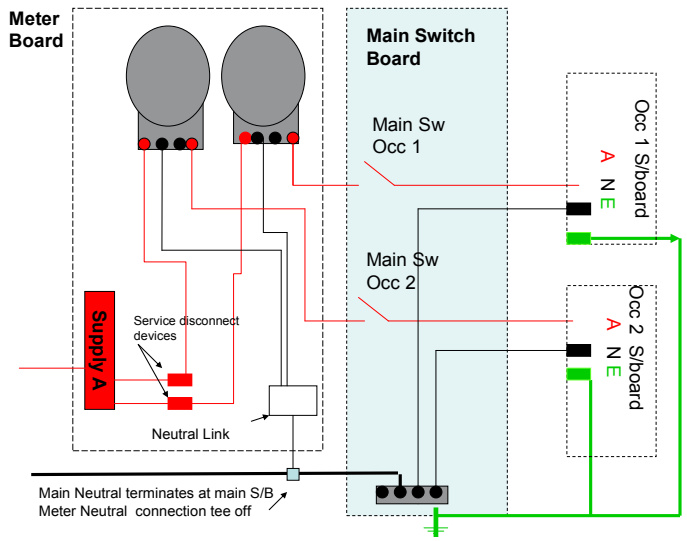
Conduct continuity test between active and neutral at occupancy switchboard.

Resistance of **0.5 ohm** or less validates occupancy switchboard neutral bar as the NITP.



MEN at Occupancy Switchboard

- Confirm an independent earth can be established.
- Install bridge between load active & load neutral at meter position.
- Conduct continuity test between active and neutral at occupancy switchboard.
- Resistance of **0.5 ohm** or less validates occupancy switchboard neutral bar as the NITP.



NOTE: If an independent earth cannot be established, the MEN/earthing system cannot be used as an independent earth.

Where an independent earth cannot be established – DO NOT CONTINUE and refer to relevant Distributor's procedures.

4.15 Existing Installation Alteration and/or Additions - CT Metering

When conducting works on CT Meter Panels the worker shall consider the wiring arrangement of the particular installation and where appropriate, supplement this procedure with additional practices as required within the Code.

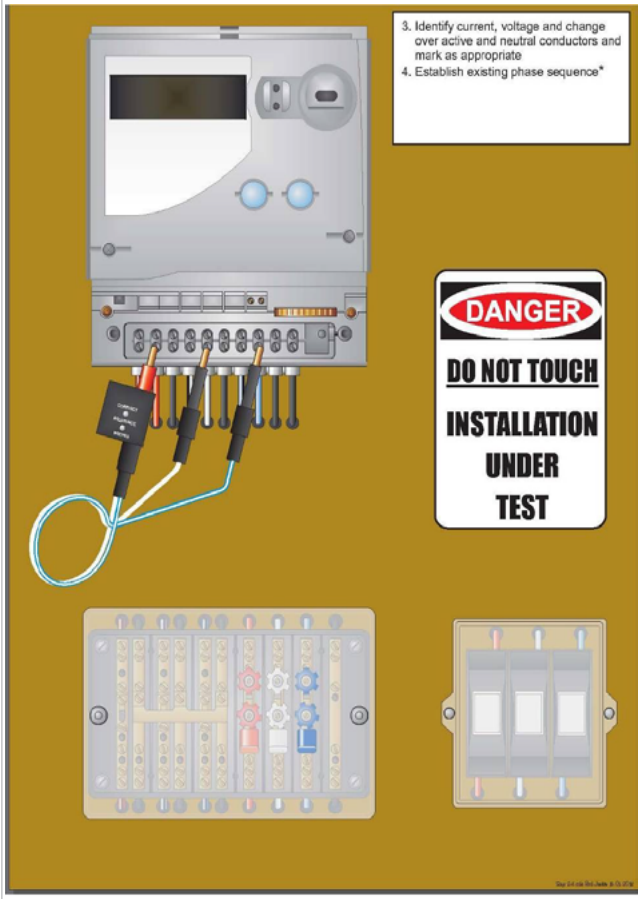
Testing and configuration variables will require reference to individual Distributor and meter provider procedures.

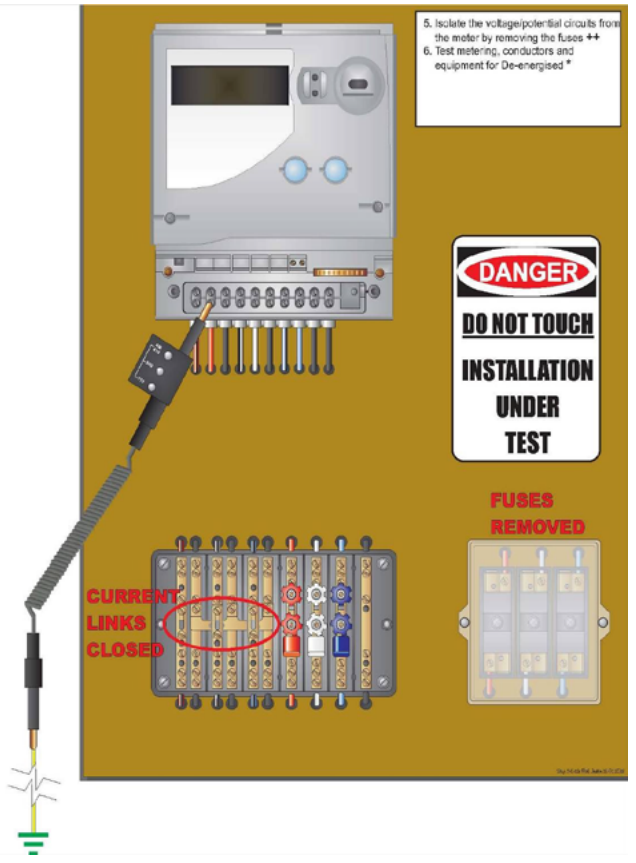
1. Test the work area for de-energised. * ++
2. Install "Installation Under Test" notice/s.
3. Confirm single metering neutral conductor
4. Visually confirm MEN connection point or neutral bar/link at remote meter board as the NITP.*
5. Establish existing phase sequence (3 phase only). *
6. Identify and mark/tag all conductors as appropriate.
7. Remove the service/supply and time switch fuse/s (As applicable).
8. Test for de-energised metering conductors & equipment. * ++
9. Remove meter/s and/or metering equipment and re-test conductors for de-energised (As applicable)*
10. Carry out metering alteration/addition.
11. Ensure all supply and outgoing conductors are correctly connected.
12. Perform Check Test/s (includes switched circuits) * ++
13. Leave service/supply fuse/s inserted.
14. NST to Neutral Integrity Test Point * ++
15. Confirm original phase sequence. (3 phase only).*
16. Load test. *
17. Equipment functionality tests.
18. Check all connections and equipment.
19. Seal Equipment.
20. Leave "On" or "Off" in accordance with the Distributors procedures.

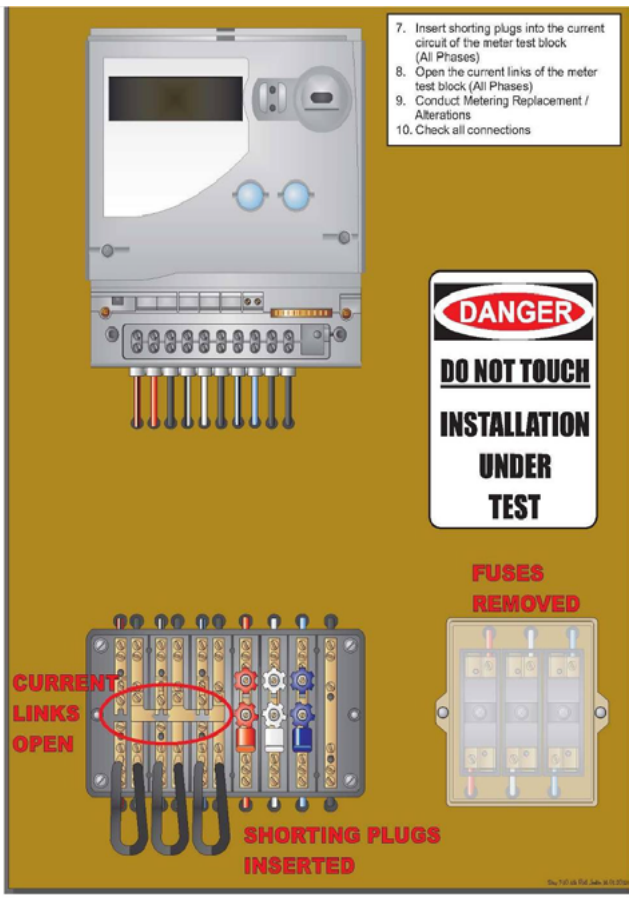
* Refer to individual test procedures.

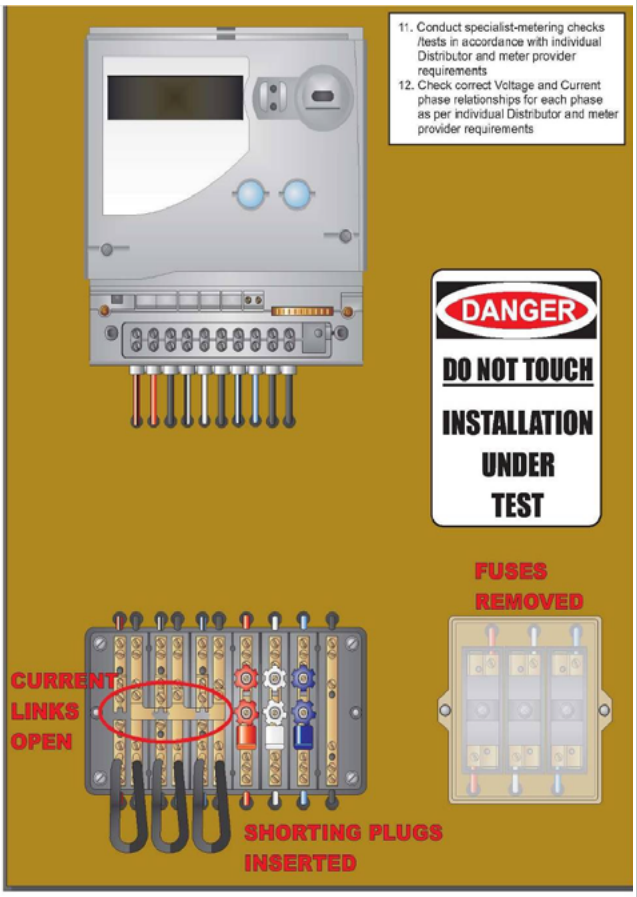
++ **Refer to individual Distributor procedures where there are no fuses on the panel.**

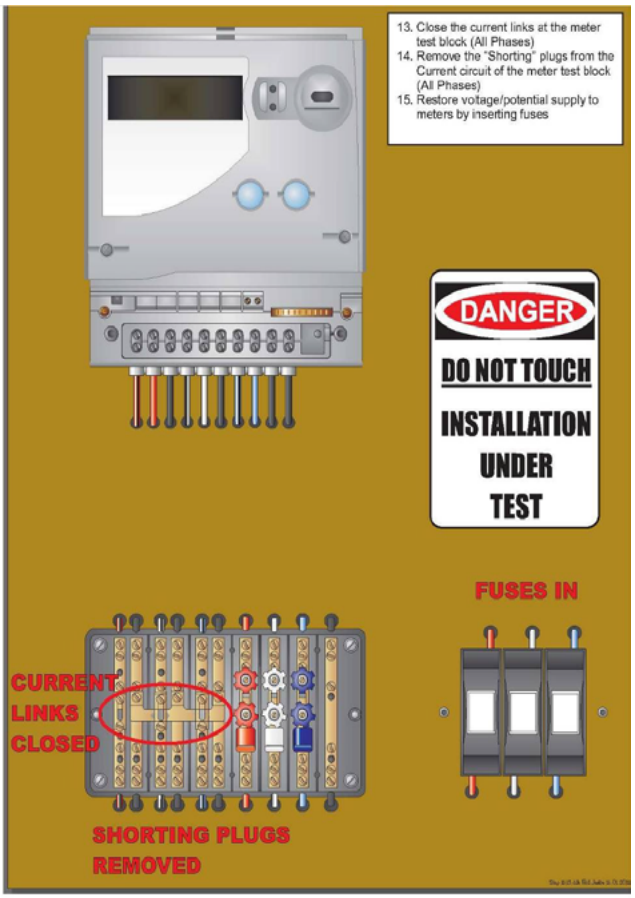
Typical Arrangement



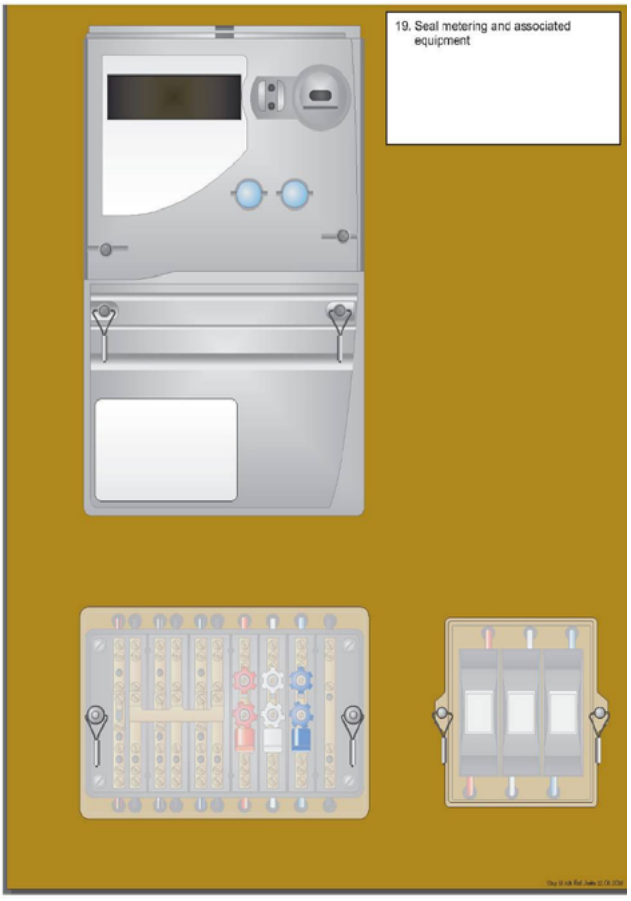





11. Conduct specialist-metering checks /tests in accordance with individual Distributor and meter provider requirements
12. Check correct Voltage and Current phase relationships for each phase as per individual Distributor and meter provider requirements
DANGER
DO NOT TOUCH
INSTALLATION UNDER TEST
FUSES REMOVED
CURRENT LINKS OPEN
SHORTING PLUGS INSERTED


13. Close the current links at the meter test block (All Phases)
14. Remove the "Shorting" plugs from the Current circuit of the meter test block (All Phases)
15. Restore voltage/potential supply to meters by inserting fuses
DANGER
DO NOT TOUCH
INSTALLATION UNDER TEST
FUSES IN
CURRENT LINKS CLOSED
SHORTING PLUGS REMOVED


16. Undertake final specialist-metering checks/tests in accordance with individual Distributor and meter provider requirements
17. Confirm original phase sequence
18. Conduct equipment functionality checks
DANGER
DO NOT TOUCH
INSTALLATION UNDER TEST


19. Seal metering and associated equipment

4.16 Abolishment of Electricity Supply

Objective

To make certain of the appropriate supply abolishment at an installation or occupancy within an installation by:

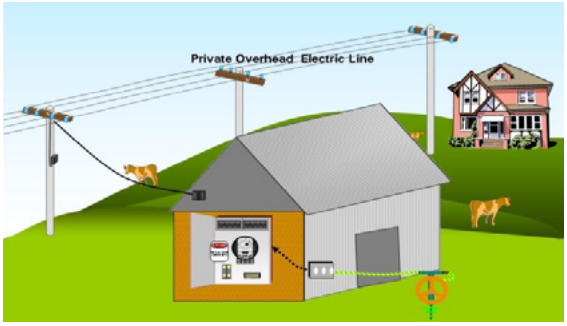
a. Removal of OH service cables; or
b. Termination of UG service cables; or
c. Disconnection by an REC of customers supply cables; and
d. Ensuring the supply point and all disconnected conductors are left in safe condition, and the metering and supply conductors cannot be inadvertently energised.
e. Ensure continuity of all neutrals to remaining installations/occupancies

The following procedure will achieve the objective for the majority of abolishments. Adjustments must be made by the person responsible for the abolishment to meet the above objective where it is not covered by the procedure.

4.16.1 Typical Abolishment - Overhead Supply

Installation/Occupancy

1. Test for de-energised where appropriate*
2. Identify correct site location – meter number
3. Confirm abolishment requirement if possible (optional)
4. Identify if installation wiring work is required – If it is, do not proceed until appropriate arrangements are made by the customer's agent (REC)
5. Install Installation under test notice
6. Switch off main switches (optional)
7. Remove SPD/SDD as appropriate.

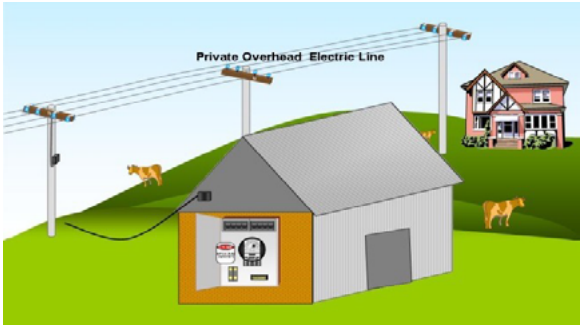


Supply End

8. Identify service cable conductors or consumer mains conductors to be disconnected
9. Disconnect and remove active then neutral conductors from supply points
10. Ensure supply points are left in a safe condition

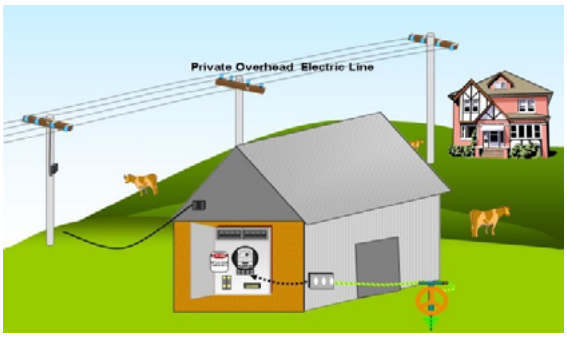
As applicable:

- Check that only conductors intended to be disconnected are disconnected
- Remove overhead service cable
- Remove underground service cable or ensure cable/s are correctly identified by continuity test, insulated and terminated.

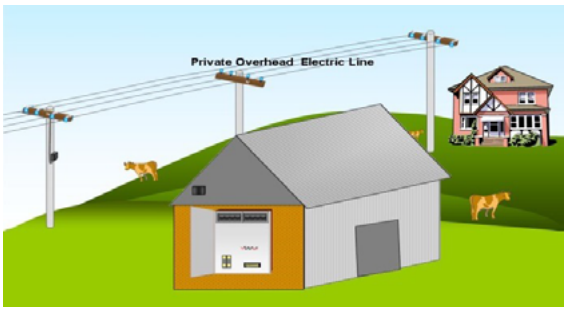


Installation/Occupancy

11. Test for de-energised*



12. Remove metering and Distributor's supply assets & re-test conductors for de-energised*
13. Ensure metering and supply conductors cannot be inadvertently energised or reconnected, and that the above objectives have been met.



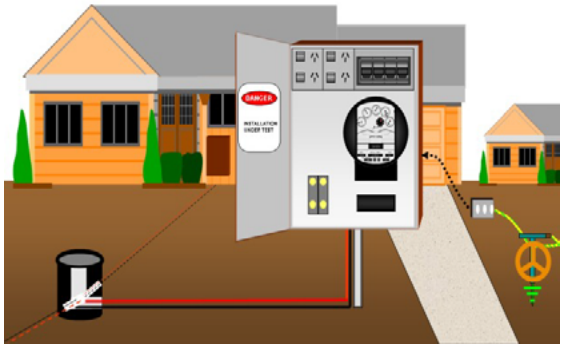
Note: Should further work be required by customer/REC – Defect notice may need to be issued.

* Refer to individual test procedures

4.16.2 Typical Abolishment - Underground Supply

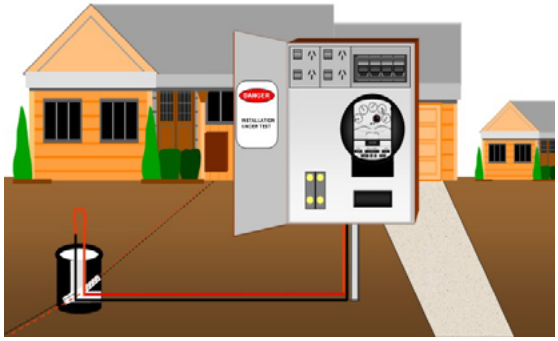
Preliminary Site Checks

1. Test the work area for de-energised*
2. Identify correct site location – meter number.
3. Remove service fuse/s carrier/s.
4. Install installation under test notice.



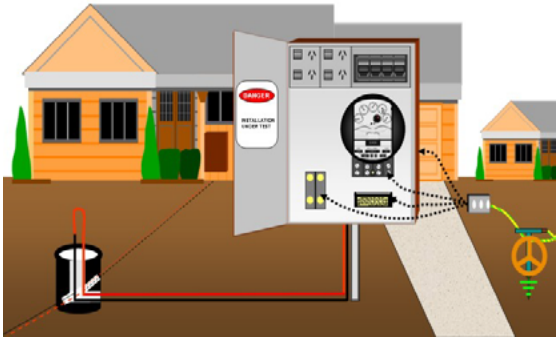
Supply/Pit End

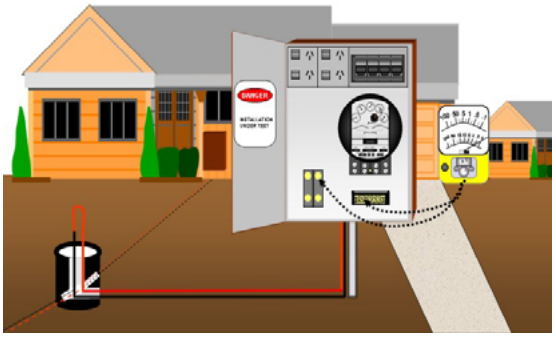
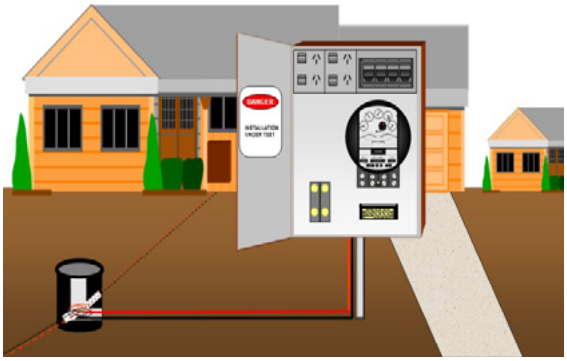
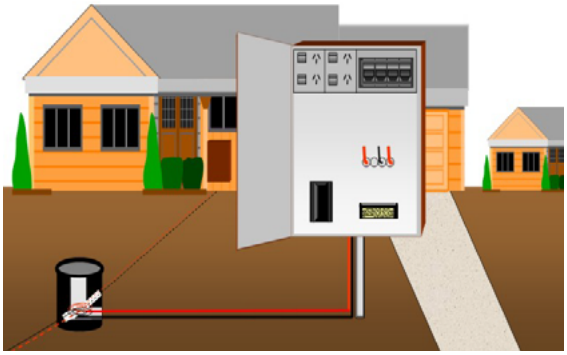
5. Identify underground consumer's mains active/s and disconnect.
6. Identify underground consumer's mains neutral and disconnect.
7. Make supply active conductor/s safe.
8. Test underground consumers mains for de-energised.*
9. Bridge underground consumers mains active and neutral conductor/s.



Installation End

10. Test work area, fuse and meter terminals for de-energised.*



Installation End 11. Conduct continuity test between active/s and neutral on underground consumer mains. (Less than **0.5 Ω** required).	
Supply/Pit End 12. Seal/insulate all unterminated cables ends.	
Installation End 13. Remove metering equipment. 14. Remove fuse/s from carrier/s and refit carriers.	

4.17 Network "High" Voltage Injections

Definitions

Network "High" Voltage Injections – means an injection of High Voltage alternating current, Direct Current or Low Voltage alternating current to conductors not intended for those voltages. A reference anywhere in this document to HV, HV Conductor or HV contact, etc, shall be read in the context of this definition.

Distributor's responsible officer - means the officer appointed by the responsible Distributor for administration of the incident.

Persons authorised by the Distributors - means a person who holds an authorisation from the relevant Distributor to perform the work on the Distributors behalf.

4.17.1 Confirmation of Injection

The ***Distributors responsible officer*** confirms injection by:

a. Confirmation of the:
   i. Network fault and effects; or
   ii. Points of contact of HV conductors with LV conductors and effects; or
   iii. Installation/s damage through customer or other person's advice.

or

b. An investigation of installations suspected to be affected. The investigation shall be conducted by a person who holds a current Electrician's Licence or is a Licensed Electrical Inspector authorised by the Distributor, and be of a comprehensive enough sample of installations and nature for the Distributors responsible officer to determine whether or not an injection has occurred.

4.17.2 Determining the installations to be investigated

The ***Distributors responsible officer*** determines the installations to be investigated.

FAULT	INSTALLATIONS TO BE INVESTIGATED
HV and active LV conductors contact	Installations connected to the LV active conductor or conductors contacted by HV.
HV conductor contact with the neutral LV conductor on an IMEN system.	Installations connected to the neutral of that transformer.
HV conductor contact with the neutral LV conductor on a MEN or CMEN system.	Installations connected to the neutral conductor that are within 250m conductor length from the location of the injection (including tee-offs); and Where damage is reported beyond these points, to the next installation beyond where damage is reported.
Equipment failure has caused HV voltage in the neutral LV conductor.	Installations within 250m conductor length downstream of the equipment failure (including tee-offs); and Where damage is reported beyond these points, to the next installation beyond where damage is reported.
Injection is suspected to have occurred due to installation equipment damage and there is no identified Distributors equipment failure or HV contact with LV conductors.	The installation with equipment damage.
HV conductor to HV distribution conductor contact.	Installations reporting damage.

4.17.3 HVI Confirmed – Isolation Process

Unless otherwise determined by the Distributors responsible officer, a person authorised by the Distributor shall:

1. Isolate all installations connected to the LV conductor or conductors as identified by the investigation.
2. Where practicable, advise customer/s of isolation and supply restoration process; and
3. Isolate installations to be inspected from the distribution system prior to re-energisation of the distribution conductors; and
4. Ensure precautions are taken to prevent re-energisation of each isolated installation prior to its inspection.

4.17.4 Installation inspection

Unless otherwise determined by the relevant Distributor's responsible officer:

a. **The inspection**:

   i. Shall be conducted by a person who holds a current Electrician's Licence or is a Licensed Electrical Inspector authorised by the Distributor; and

   ii. Shall ensure the electrical integrity and safety of each installation by visual inspection and, if appropriate, testing of wiring and equipment to determine the presence and extent of any damage.

b. **Inspection procedure**:

At each accessible installation:

- Check and where applicable isolate alternate supplies; and
- Turn all main switches off and isolate all circuits.
- Inspect and, if appropriate, test for anomalies and damage of the:
  - Point of attachment;
  - Service Protection equipment;
  - Consumer mains connections;
  - Metering equipment *;
  - Main Switchboard equipment; and
  - MEN connection.

* **Note**: Organisational procedures may require metering equipment subjected to a HVI to be visually inspected with the terminal covers removed, and for any damaged metering equipment to be replaced prior to energisation.

   i. Where anomalies and/or damage that prevents safe energisation of the switchboard is identified:
      - Make safe; and
      - Advise the customer of the anomaly and/or damage, and the suggested repair and supply restoration process in accordance with the Distributors requirements.

   ii. When identified anomalies and/or damage that prevented safe energisation of the switchboard are repaired, and/or where no damage has been identified:
      - Re-energise installation;
      - Check supply to main switchboard;
      - Check for and replace malfunctioning metering equipment.
      - Re-energise circuits whilst inspecting and testing as appropriate to identify any anomalies and damage;
      - Check any identified anomaly and damage and make safe;
      - Advise the customer of the inspection result, and of any identified anomaly and/or damage, and the suggested repair process in accordance with the Distributors requirements.

   iii. Advise the relevant Distributor of each inspection result in accordance with the Distributors requirements.

c. **Inaccessible installations**:

In accordance with the Distributors requirements

   i. Where practical, advise customer/s from site that access is required;

   ii. If unable to advise customer, leave written advice in a conspicuous location containing brief fault details and a contact number to contact the relevant Distributor to arrange access;

   iii. Leave installation de-energised;

   iv. Advise the relevant Distributor; and

   v. Perform “Inspection procedure” when access available

4.18 UG Mains Cable Fault - Restoration of Supply

The procedure below applies for underground cable faults where installations on the circuit require the service neutral to be disconnected to allow fault finding on the mains cable (i.e., by lifting of the main neutral at the neutral link and removal of the fuse/s at individual meter positions).

Where the installations on the affected circuit do not require disconnection of the service neutral to enable identification of the fault (i.e. fault location identified without testing), refer to individual Distributors procedures for reconnection of mains cables.

Personnel are to be aware that where the service tee neutral connection is disconnected from a mains tee joint, a polarity/NST test is to be undertaken at all installations affected by that disconnection.

Cable fault location to be identified by test:

Isolate all installations on the affected circuit by undertaking the following steps:

At each individual meter position:

4. Turn off the customers main switch where possible
5. Remove service/supply fuse/s
6. Test for de-energised. *
7. Identify consumers incoming mains neutral and ensure it is disconnected and made safe.
8. Install “Installation Under Test” notice or applicable warning tape

Locate the fault and rectify

On restoration of supply to the Network LV UG cable:

At the meter position of one installation upstream of the cable fault.

1. Check main switch/s are “OFF”
2. Establish NITP *
3. Polarity Test all incoming consumer’s mains conductors. *
4. NST incoming consumer’s mains neutral. *
5. Connect consumers mains incoming neutral conductor.
6. Check Test *
7. Leave service fuse/s inserted
8. Conduct NST to NITP
9. Seal equipment

At the meter position of the remaining installations upstream of the cable fault. +

1. Establish NITP *
2. Connect consumers mains incoming neutral conductor.
3. Check Test. *
4. Leave service fuse/s inserted.
5. Conduct NST to NITP.
6. Seal equipment.

At the meter position of the most appropriate installation downstream of the cable fault. (3 phase if possible / first installation)

1. Check main switch/s are “OFF”
2. Establish NITP *
3. Polarity Test all incoming consumer’s mains conductors. *
4. NST incoming consumer’s mains neutral. *

5. Connect consumer's mains incoming neutral conductor.
6. Phase Sequence Test (if applicable) ++
7. Check Test *
8. Leave service fuse/s inserted
9. Conduct NST to NITP
10. Seal equipment

At the remaining installations downstream of the cable fault.

1. Establish NITP *
2. Connect consumer's mains incoming neutral conductor
3. Check Test *
4. Leave service fuse/s inserted
5. Conduct NST to NITP
6. Seal equipment

+ Where any installation is disconnected from a pit or pillar, standard testing is required at all installations supplied from the pit or pillar as per the individual procedures outlined in this manual or the relevant Distributor's procedure as applicable.

++ As the phase sequence is unable to be confirmed prior to disconnection, a competent person is to ensure the original phase sequence is returned to the faulted circuit.

For further information refer to Section 3.9, Phase Sequence Test

Note 1: Refer to individual Distributors procedures to ensure all installations that were disconnected have been reconnected.

Note 2: Where nonstandard servicing arrangements exist at an installation, refer to individual Distributor procedures for testing requirements.

Note 3: For cable faults on consumer's underground cables, refer to testing as per section 4.5 and/or the individual Distributor procedures.

Note 4: Installations affected may also include public lighting columns or frangible poles. Where a public light requires disconnection and reconnection, refer to individual procedure 4.9 or 4.9.1 and substitute applicable steps into the above procedure as required.

Information contained within this section shall be read in conjunction with all sections of this Installation Supply Connection Tests & Procedures manual.

APPENDICES

5.1 Testers

5.1.1 Neutral & Supply Tester (Model M1110) – Fault Investigation Guide

Purpose

This fault investigation guide is to assist in rectification of faults discovered during the performance of connection testing procedures.

Depending upon methods of testing and other distribution factors the Neutral & Supply Tester does not always identify all neutral faults. Therefore this guide is not designed for, nor should be used for circumstances where a fault has been reported to the Distribution Business.

General Information

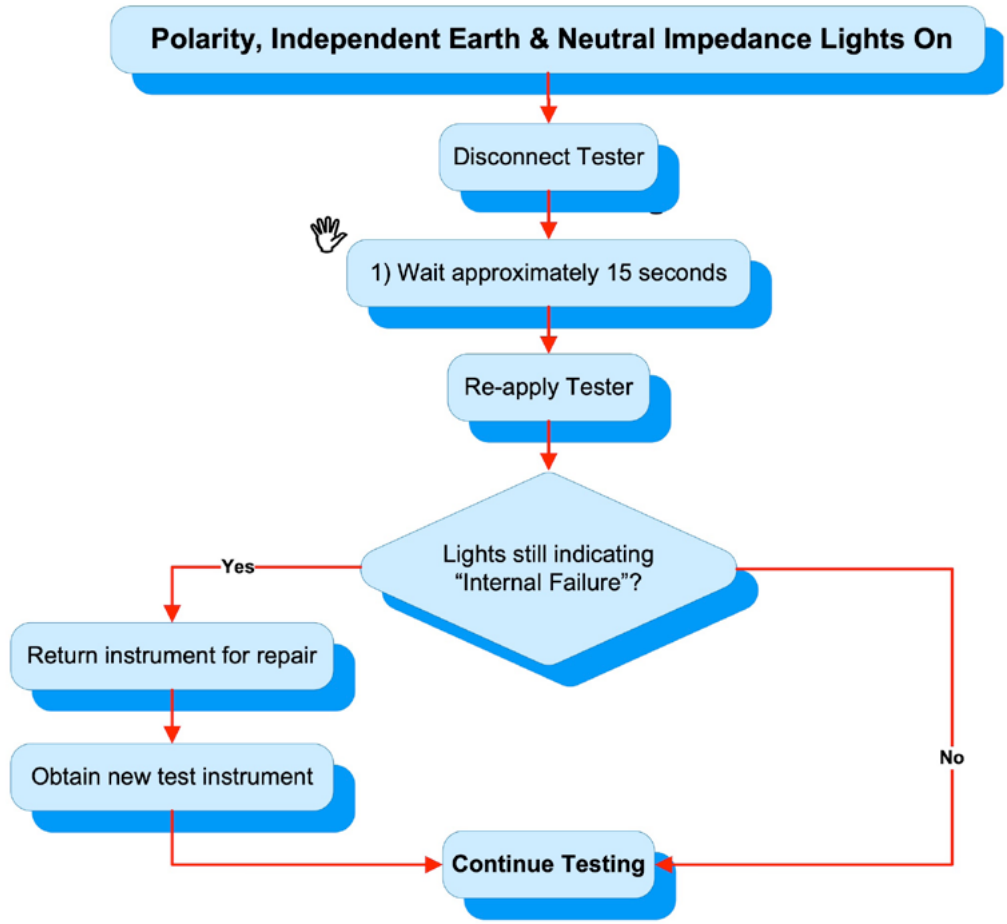
Given the variables in different connection procedures and supply arrangements, this guide is in the format of flow charts with Handy Hints indicated by the symbol ✋ and number to be referenced at the bottom of each chart.

Test Step	Test Function	Power Green	Ready/ Pass (Green)	Ind. Earth (Red)	Polarity (Red)	Neutral Imp (Red).	ALARM	COMMENT
Self Check 1	Supply volts > 150V	OFF	OFF	OFF	OFF	OFF	OFF	No supply or instrument failure
		DIM	OFF	OFF	OFF	OFF	OFF	Voltage < 150V
		ON	OFF	OFF	OFF	OFF	OFF	Acceptable result, next test
Self Check 2	Instrument internal operation check	ON	OFF	Flashing	Flashing	Flashing	YES	Internal failure of tester
			OFF	OFF	OFF	OFF	NO	Acceptable result, next test
Live Test 1	Active to neutral voltage is within acceptable tester operation range of 205v – 264v (+ - 5%)	ON	Dim & flashing quickly	OFF	OFF	OFF	NO	Neutral connection made to isolated length of conductor – e.g. Floating neutral
			OFF	OFF	ON	OFF	YES	Voltage outside acceptable range
			OFF	OFF	OFF	OFF	NO	Acceptable result, next test
Live Test 2	Neutral to earth volts < Active to earth volts	ON	OFF	Flashing	Flashing	OFF	YES	Neutral to earth > Active to earth Probable reverse polarity
			OFF	OFF	OFF	OFF	NO	Acceptable result, next test
Live Test 3	Neutral to earth volts < 5v (+- 5%)	ON	OFF	ON	OFF	OFF	YES	Voltage of test neutral > than 5V
			OFF	OFF	OFF	OFF	NO	Acceptable result, next test
Live Test 4	Neutral to Earth Impedance < 10 kΩ	ON	OFF	ON	OFF	OFF	YES	Independent earth impedance > 10kΩ
			OFF	OFF	OFF	OFF	NO	Acceptable result, next test
Safe to Proceed	All the above tests pass	ON	Flashing	OFF	OFF	OFF	NO	Acceptable result, next test
Touch Pad (where fitted)	Active to Neutral Supply Impedance < 1Ω	ON	OFF	OFF	OFF	ON	YES	Active to Neutral impedance is > 1Ω
			ON	OFF	OFF	OFF	NO	Acceptable result – NST Pass

Power Light On – Ready Pass Light Flashing Dim and Quickly

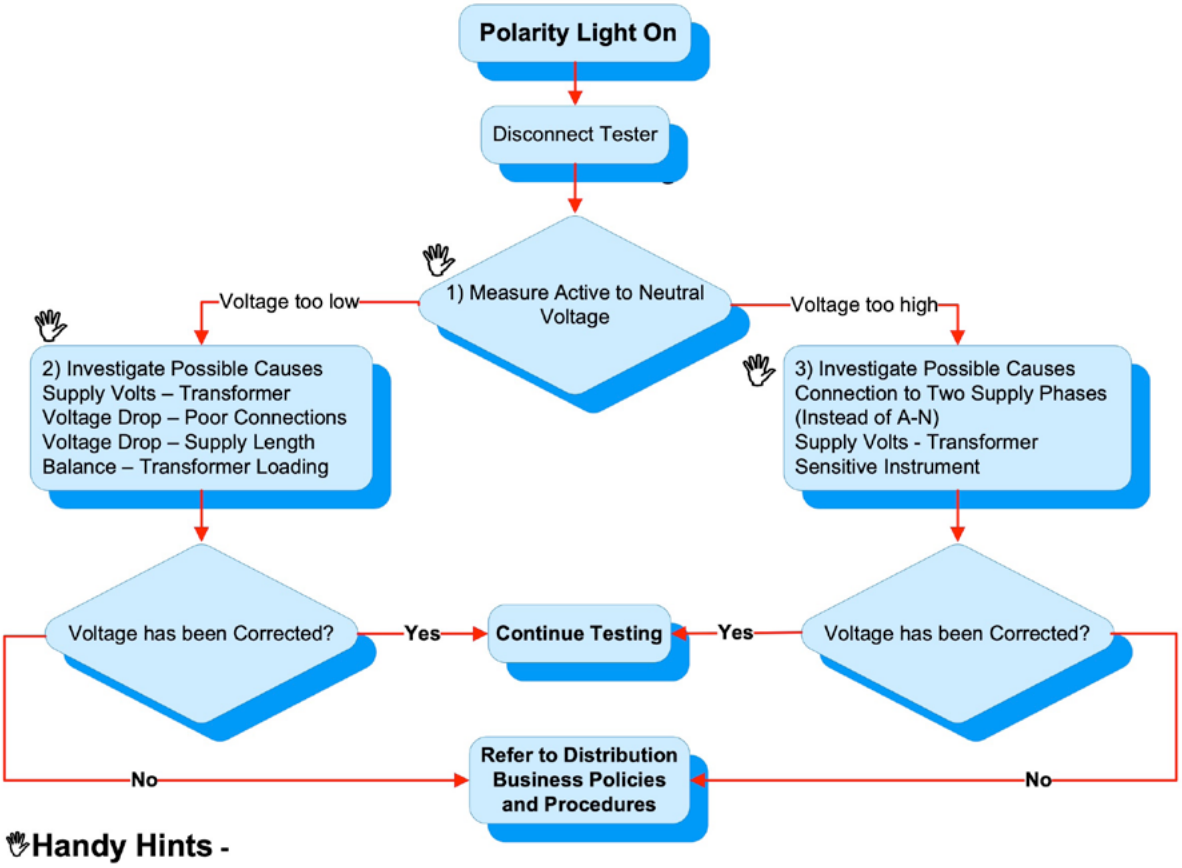
Indication that the neutral under test is not connected to a point of different potential, e.g., (floating).

Note: Dependant upon other circuit factors this light may not activate in all circumstances, although the fault will be indicated through the activation of the polarity light (active to neutral supply voltage outside the acceptable test range), or other fault indication.



Handy Hints -

1. An intermittent contact made with the active test probe during the testing may disturb the instruments test sequence resulting in the indication of an internal failure on some testers. The re-application of the tester after waiting approximately 15 seconds may reset the tester for correct operation.
   Should the tester still indicate an internal failure, return the instrument for repair.



Handy Hints -

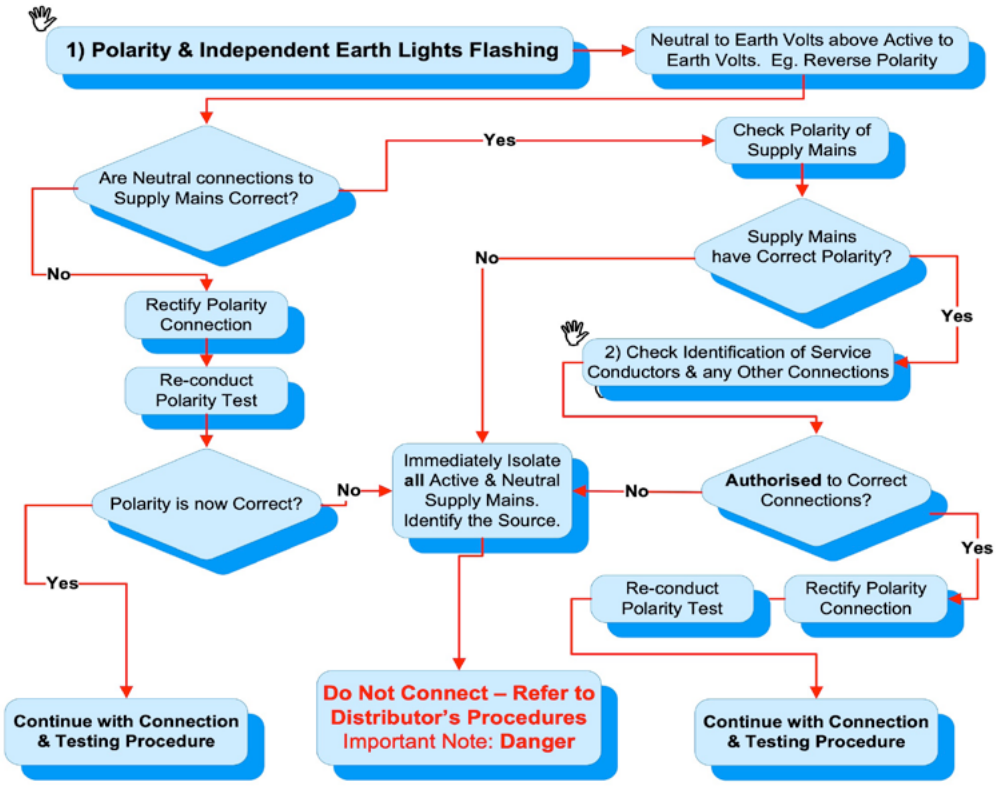
1. Utilising a voltmeter, gain an accurate measurement of the voltage of the supply phase under test.
2. In some circumstances correct voltage may be obtained by balancing load across phases. If this is not achievable, increasing the secondary voltage of the supply transformer may be an option, although the resultant increase in voltage to customers upstream towards the supply transformer must also be considered in these circumstances.

   Where poor connections are suspected, testing across the connection with a voltmeter is a valuable method of identifying abnormalities.

   If the supply volts are low as a result of insufficient cable size or excessive supply length and cannot be rectified, refer to the Distribution Business policies and procedures.
3. Some Neutral and Supply Testers may indicate a fault with voltages that are within the acceptable supply range e.g. 252v. The application of another, less sensitive Neutral & Supply Tester may result in the correct testing results being obtained.

   Where the supply voltage is high consider decreasing the secondary voltage on the supply transformer. Consideration must be given to the resultant effects on voltage to customers downstream in the supply system when exercising this option.

   The **Power Light** activating immediately upon the neutral test lead being connected to the neutral under test, indicates the neutral under test is alive. **Danger** - The active test lead will immediately be alive in these circumstances.



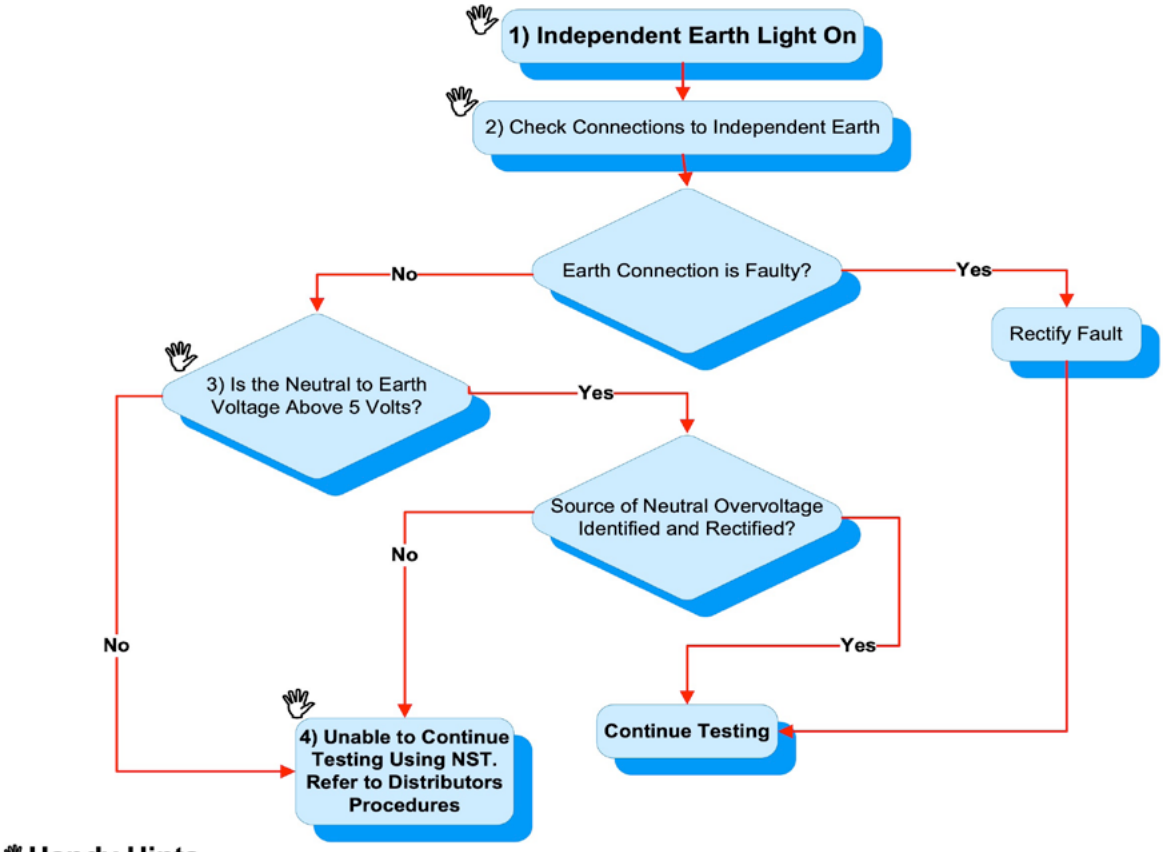
Handy Hints –

1. The **Power Light** activating immediately upon the neutral test lead being connected to the neutral under test, indicates the neutral under test is alive. **Danger** - The active test lead will immediately be alive in these circumstances.
2. Sources of incorrect polarity may include incorrect identification of conductors by persons not directly involved in the connection process e.g. Licensed Electrical Contractor. If the source of the reverse is unable to be identified, or the connector is not authorised to correct the source of reverse, isolate all active and neutral service conductors from the supply mains and refer to the Distribution Business policies and procedures.

   Note: Work shall only be conducted by persons **authorised** to perform such work in accordance with Section 1 Clause 1.10 of these procedures.

   Important Note: **Danger**
   A reverse polarity will result in the earthing system of an electrical installation becoming alive.

   In circumstances where the polarity of supply mains is reversed it is essential that the source is immediately identified. In addition to this, all installations connected to the supply network downstream of the source, shall have all active and neutral conductors isolated from the network and each installation prepared for polarity testing prior to the polarity of the supply mains being corrected. Upon re-energisation each installation shall be tested individually to ensure correct polarity and neutral impedance is obtained to all installations.

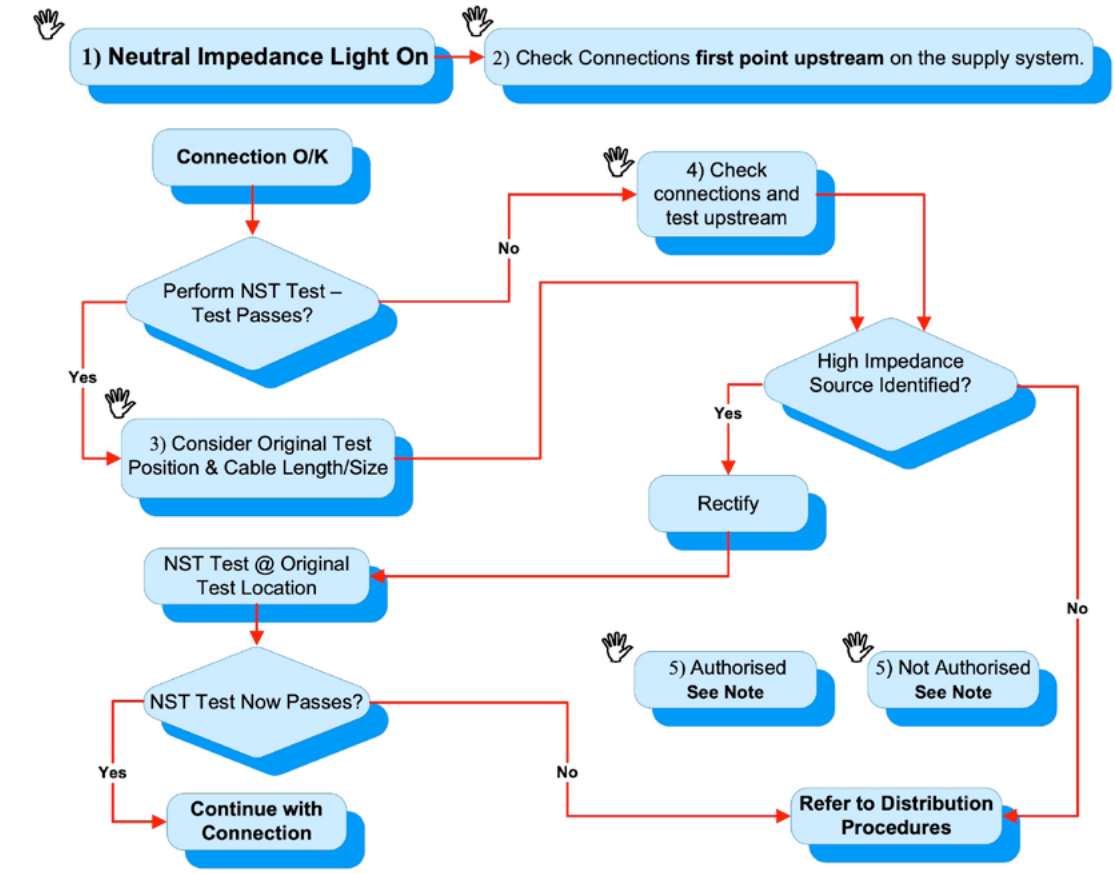


Handy Hints -

1. The activation of this light may indicate one of two testing faults being either, the connection of the independent earth is above 10kΩ to earth, or the voltage of the supply neutral is greater than 5 Volts.
2. The connection of the test instrument to earth is the most common cause of this fault. Check the continuity of the testing circuit to earth and that the independent earth is in a good body of soil and that the reel and connections are in good condition
3. Where voltage on the neutral conductor is suspected gain an accurate indication of voltage testing with a voltmeter to an independent earth.

   Although not without weaknesses, greater than five volts on the supply neutral may often be the result of an existing high impedance neutral under load from other customers within the sub circuit. This may be due to insufficient cable size, excessive supply length or poor conductor connections. Where conductor connections are suspected, testing across either side of neutral connections with a voltmeter is a valuable method of identifying abnormalities.

   In addition to this, the balance of load within the system will also have effects upon the neutral voltage although should not be looked at as the primary source unless the supply neutral conductor and connections are considered suitable.
4. In some installations voltage may be found on the neutral conductor through the harmonic effects of the electrical apparatus on the circuit. This is particularly common in large installations e.g. shopping centres and may not be capable of being rectified by the connector. In such circumstances refer to Distributors policies and procedures for guidance.



Handy Hints -

1. Ensure that the connections of the test instrument to the apparatus under test are electrically sound, as unsatisfactory connections will effect the testing results.
2. The neutral impedance light activates when the supply Active to neutral impedance is greater than 1Ω. Therefore the impedance may be within the supply active, the supply neutral or a collective combination of both.
3. Consider the original test position in relation to the cable length and size. An increase as low as .1Ω may result in a test failure when there is existing impedance of 1Ω upstream.
4. Although not without weaknesses, neutral impedance located on supply mains of a LV circuit would most likely be indicated with the Independent Earth Light (Neutral greater than 5 volts) activating on the Neutral & Supply Tester as a result of load from other customers. As this neutral voltage will depend upon distribution loading this handy hint has weaknesses but should be considered when investigating such faults.
5. Sources of high impedance may include connections or conductors that are not the responsibility of persons involved in the connection process e.g. Licensed Electrical Contractors.

> **Note:** Work shall only be conducted by persons authorised to perform such work in accordance with Section 1 Clause 1.9 of these procedures

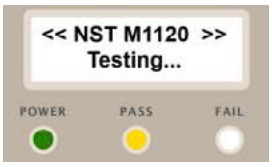
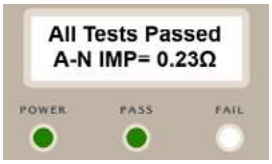
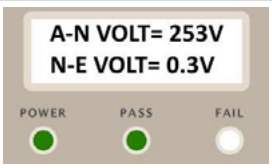
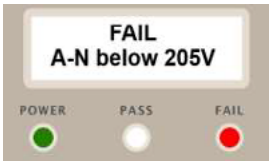
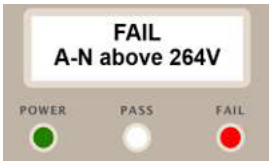
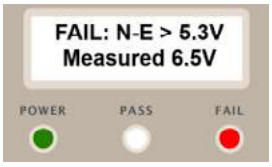
5.1.2 Digital Neutral Supply Tester (Model M1120 V1 & V2) Screen display

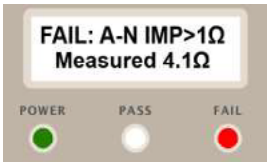
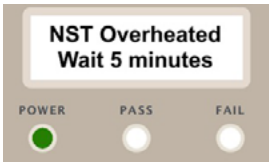
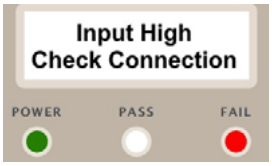
Users of the Digital NST (M1120 V1 & V2) should refer to the manufacturer's manual for the instrument's specifications, operational information including care and use.

The message screens listed have been extracted from the manufacture's users guide that indicate a range of PASS/FAIL situations that may be encountered

A number of these equate to similar results that are indicated with LCD and audible output combinations of the earlier model NST (M1110).

Where a "FAIL" (and value) is encountered, reference to the – NST Fault Investigation Guide and Fault Flow charts in 5.1.1 may assist personnel in identifying the cause to enable an appropriate response to rectify such faults.

NST M1120 display		
LCD DISPLAY	**DESCRIPTION**	**COMMENT**
	Active or Neutral may not be continuous.	• No supply registered by the instrument • Defective leads/ connections • Faulted instrument
	NST is conducting its series of tests. (Pass LED Blinks on and off)	Normal testing cycle taking place
 	All measurements are within specifications. Screen alternates between: • Active to Neutral impedance value shown. • Active to Neutral and Neutral to Earth Voltages	All tests successfully completed
	Active to Neutral voltage is less than 205VAC threshold. The NST will beep every second until disconnected	Low Volts – connection/supply issue
	Active to Neutral voltage is above 264VAC threshold. The NST will beep every second until disconnected.	High Volts- supply issues
	Neutral to Earth voltage is above 5.25VAC threshold. Second line shows actual voltage reading. The NST will beep every second until disconnected.	Needs addressing for rectification Some LV situations have this as an inherent system problem. –seek assistance

NST M1120 display (continued)		
LCD DISPLAY	DESCRIPTION	COMMENT
	Active to Neutral impedance is above 1Ω threshold. Second line shows actual measurement The NST will beep every second until disconnected	Needs addressing and rectification A &/or N connection issues
	Independent earth connection impedance is above 10kΩ threshold. The NST will beep every second until disconnected	Check independent earth connections and check stake is making positive contact with the ground
	Active and Neutral leads have been connected incorrectly and must be swapped. The NST will beep every second until disconnected	Urgent and dangerous Immediate action required
	The reference resistor has overheated and the NST has shut down. Resume measurements once the NST has cooled sufficiently. The NST will beep every second until disconnected	Operational temp range is -10 to 55 deg.C Multiple consecutive tests or storage in vehicles in hot weather could possibly produce this message
	Internal NST fault has been detected. Return the instrument to the manufacturer for service. The NST will beep every second until disconnected.	Instrument fault - require alternative unit to complete tests
	(V2 model only) Check to see if the NST has been connected across phases. i.e. Voltage measured by NST is above 400V	Reconnect between Phase and Neutral

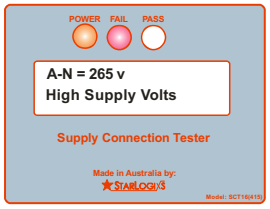
5.1.3 Digital Supply ConnectionTester StarLogixs SCT16(415) Screen Display

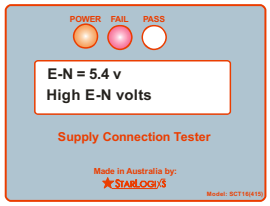
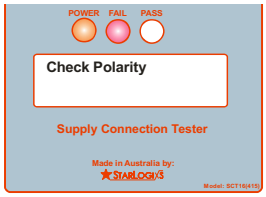
Users of the Digital SCT unit should refer to the manufacturer's manual for the instrument's specifications, operational information including care and use.

The message screens listed have been extracted from the manufacture's users guide that indicate a range of PASS/FAIL situations that may be encountered

A number of these equate to similar results that are indicated with LCD and audible output combinations of the original model NST (M1110).

Where a "FAIL" (and value) is encountered, reference to the – NST Fault Investigation Guide and Fault Flow charts in 5.1.1 may assist personnel in identifying the cause to enable an appropriate response to rectify such faults.

SCT16(415) display		
LCD DISPLAY	**DESCRIPTION**	**COMMENT**
	Active or Neutral connection may be broken or internal fuses blown.	• No supply registered by the instrument • Defective leads/ connections • Faulted instrument • Low supply votage
	Supply connection tester is performing a set of measurements. Please wait for the results.	Normal testing cycle taking place
 	Green pass LED lights and beeps once. Displays Passed all Tests for 1 second, then; the next display with voltage and resistance results appears and holds this display as long as the SCT is connected to mains	All tests successfully completed
	Red fail LED lights and beeps twice. Display shows the measured value of voltage between Active and Neutral, and indicates the problem is Low Supply Voltage (ie. less than 205v).	Low Volts – connection/ supply issue
	Red fail LED lights and beeps twice. Display shows the measured value of voltage between Active and Neutral, and indicates the problem is High Supply Voltage (ie. more than 264v).	High Volts- connection/ supply issue

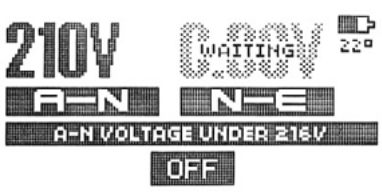
SCT16(415) display (continued)		
LCD DISPLAY	DESCRIPTION	COMMENT
	Red fail LED lights and beeps twice. Display shows measured value of voltage between Neutral and Earth for values greater than 5.3 volts.	Needs addressing for rectification. Some LV situations have this as an inherent system problem. –seek assistance
	Red fail LED lights and beeps twice. Display shows measured value of independent Earth resistance. If Earth resistance more than 10kΩ then this fault is shown.	Check independent earth connections and check stake is making positive contact with the ground
	Red fail LED lights and beeps twice. Display shows measured value of Neutral resistance. If Neutral resistance is more than 1.0Ω then this fault is shown	Needs addressing and rectification A &/or N connection issues
	Red fail LED lights and beeps twice. Display shows Check Polarity. If E-N volts greater than 30v and Neutral resistance less than 1 ohm this fault is shown. May show this when attached to three phase supply by mistake.	Urgent and dangerous. Immediate action required.

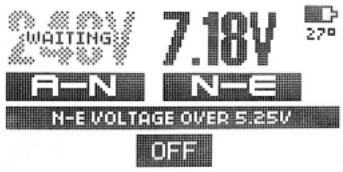
5.1.4 Digital Supply Connection/ Loop ImpedanceTester SLIM SL5215 Screen Display

Users of the Digital SL-5215 should refer to the manufacturer's manual for the instrument's specifications, operational information including care and use.

The message screens listed have been extracted from the manufacture's users guide that indicate a range of PASS/FAIL situations that may be encountered

Where a "WARNING or STOP" (and value) is encountered, reference to the – NST Fault Investigation Guide and Fault Flow charts in 5.1.1 may assist personnel in identifying the cause to enable an appropriate response to rectify such faults.

SLIM SL5215 display		
LCD DISPLAY	**DESCRIPTION**	**COMMENT**
	Active may not be continuous.	No supply registered by the instrument • Defective leads/ connections. • Faulted instrument.
	NST is conducting its series of tests.	
	All measurements are within specifications. PASS shown. Active to Neutral impedance value shown.	All tests successfully completed.
	Active to neutral Volts shown Neutral to earth volts shown	
	Active to Neutral voltage is less than 216VAC threshold.	Low Volts – connection/ supply issue.
	Unit will display voltage reading after the warning message.	

SLIM SL5215 display (continued)		
LCD DISPLAY	DESCRIPTION	COMMENT
	No earth connection.	Check Independent earth connections.
	No neutral connection.	Check leads on test unit. Check neutral connections. as may have an open circuit neutral.
	Active to Neutral voltage is above 253VAC threshold.	High Volts- supply issues
	Unit will display voltage reading after the warning message.	
	Neutral to Earth voltage is above 5.25VAC threshold.	Needs addressing for rectification. Some LV situations have this as an inherent system problem –seek assistance. refer to 4167-05-01 (NST manual) section 8.1for process above 5.25V.
	Unit will display voltage reading after the warning message.	
	Active to Neutral impedance is above 1- threshold.	Needs addressing and rectification. A &/or N connection issues.
	Active and Neutral leads have been connected incorrectly and must be swapped.	Urgent and dangerous. Immediate action required.

5.2 Unavailable Independent Earth - Multiple Occupancy Installation

Electrical Testing and Connection Testing Procedures within Multiple Occupancy Installations often pose a dilemma to the connection worker due to a lack of suitable independent earth positions. This has been particularly relevant within multi story buildings and shopping centres.

During the connection process of multiple occupancy installations it is imperative that Polarity Testing and NST Testing of the supply conductors to the main switchboard are conducted using an independent earthing system.

Where occupancies are to be connected downstream of the main switchboard or Metering Alterations/Additions are to be conducted at multiple occupancy installations, an installations earthing system may be used in substitution for the independent earth if;

- a suitable independent earth position is not available; and
- the occupancy switchboard earthing system is directly connected to the main switchboard earthing system by means of an earth conductor; and
- the supply conductors to the main switchboard had been Polarity and NST tested using an independent earth in accordance with established procedures upon connection.

> **Note:** For an existing installation already on supply, it is considered that the appropriate installation tests have been carried out at the time of connection.

5.3 Alternative and Supplementary Supplies

Introduction

Supplies to electrical installations may take the form of either approved or non-approved supply sources and have potential to pose serious electrical hazards to workers performing connection tasks.

Prior to undertaking work all supply sources shall be isolated and all apparatus deemed to be de-energised shall be confirmed to be de-energised by test before the commencement of work on that apparatus.

Note: refer to Section 3 Test Procedures

Alternative and Supplementary supplies may include:

- Alternative Supplies; (typically back up or emergency generation) Grid inverter supplies; (typically, solar photo voltaic cells, mini hydro generators, wind generators, etc).
- Battery Storage systems intended to maintain supply when normal supply is interrupted.
- Standby generation
- Other supply sources could include the some of the above and supplies from neighbouring properties and other such sources.

Other Sources of Supply

Where other sources of supply are identified the connection workers shall:

- Make the site safe via network connections or equipment and preserve the site for any pending investigation that may be required.
- Immediately notify the relevant Distribution Network Operator.
- Discontinue further connection works on the installation until notified by the Distribution Network Operator.

Alternative Sources of Supply

Installations arranged with alternative embedded generator supplies should have prominent labels fixed on the main switchboard and FOLCB, including information on the sections of the electrical installation they supply and their point of control.

Installations fitted with Grid Connected Energy Systems may be identified by the following:

- The switchboards to which the embedded generator is connected must be clearly and permanently labelled as having an inverter energy system connected to it. The main switch must also be clearly labelledand be able to be isolated and secured in the off position.
- A label indicating that an alternative power supply system is connected to the electrical installation shall be fitted at the FOLCB for an overhead electricity supply or on the consumer mains cable in the connection facility pit/pillar terminals and service fuse for underground supply.
- At the meter position, on the meter panel and ODD/ SPD

Upon identification of an approved alternative supply the connection worker shall ensure the following actions are taken:

- Where alternative supplies are installed, the worker shall ensure the isolation of the main switch for alternative supply from the Distribution System and where appropriate securing the switch in the off position.
- Where Grid Connected Energy Systems are installed the isolation main switch connecting the alternative supply to the grid shall be turned to, and secured in, the open/off position.
- Secure the isolator with a locking device, e.g., distributor sealing equipment, distributor lock or cable tie, and display a 'Installation Under Test' warning label.
- Where the isolator cannot be locked in the open/off position, apply the warning label 'Installation Under Test' and use another appropriate visual warning that requires physical removal before operating the isolator switch, e.g., adhesive warning tape.

Notes

1. Refer to **VSIR 6.9 for further information**
2. These instructions do not apply to connection works involving other forms of Grid Connected Alternative Supplies.
3. Refer to individual Connection Procedures relevant to the task to be undertaken.

5.4 Orders in Council

Background

The original development of the Neutral & Supply Tester and associated procedures in the late 1990's identified that changes to the Electricity Safety Act 1998 (the Act) were required to allow electrical workers to access terminals of a customer's electrical installation for the purpose of testing, e.g., Lifting of installation neutral at main switchboards for NST testing.

The principal order G17 April 1999 exempted certain electrical contractors and certain electrical workers, certain electrical installation work from compliance with specified provisions of the Act in specified circumstances.

Over the ensuing period, other issues were identified and changes to accommodate improved testing requirements, qualifications, training and approval of electrical workers to undertake installation connection work were introduced with amendments to the Act through additional Orders in Council :-

i. Victorian Government Gazette G36 7 Sept 2000
ii. Victorian Government Gazette G33 11 Aug 2009

In December 2020 G51 was Published and come into operation on 1 January 2021.
With the introduction of G51 the order in councils G17,G36 & G33 have now being revoked.

Extracts (in part) of G51 Orders in Council are presented for general information in the following pages.

Electricity Safety Act 1998

ELECTRICITY SAFETY EXEMPTIONS ORDER 2020

Order in Council

The Governor in Council, under section 4 of the Electricity Safety Act 1998 (the Act), makes the following Order to declare that certain provisions of the Act do not have effect to the extent specified.

1. Citation

This Order may be cited as the Electricity Safety Exemptions Order 2020.

2. Commencement

This Order comes into operation on 1 January 2021

Column 1 – Exempt Person	**Column 2 – Exemption**
NEUTRAL INTEGRITY AND POLARITY TESTING	
7. Person disconnecting and reconnecting consumer mains for neutral integrity and polarity testing	Sections 30 and 36 of the Act do not have effect in relation to any electrical contracting in respect of the disconnection or reconnection of a consumer mains or submains neutral conductor for the purpose of conducting neutral integrity and polarity testing in accordance with the requirements of the VESI Connection Manual.

Column 1 – Exempt Person	**Column 2 – Exemption**
ELECTRICAL INSTALLATION WORK BY D CLASS LICENSED LINEWORKERS	
14. Person who is a class D lineworker	Sections 36 and 38(a) of the Act do not have effect in relation to a class D lineworker that carries out the following work on electrical installations – A. the repair or replacement, for the purpose of restoring electricity supply to a consumer, of apparatus installed at the junction between a MEC's conductors and the consumer's conductors or on a panel provided solely for a MEC's metering and control equipment; B. work on high voltage aerial electric lines in an electrical installation and associated pole mounted and pad mounted substations and equipment; C. installation and associated equipment installed for the control or protection of those lines; D. the jointing, transition jointing, terminating or connecting of underground consumer mains. **Conditions** This exemption is subject to: (a) in the case of the exempt person carrying out the work referred to in paragraph (A), being authorised by a MEC or network infrastructure company to carry out electrical installation work of that type; and (b) the exempt person carrying out the electrical installation work under the effective supervision of a licensed electrician. Note: in accordance with sections 41B(1) and 45A of the Act, the supervising electrician is deemed to be the person carrying out the electrical installation work and is required to complete and give a certificate of electrical safety for the work.

	Extended application This exemption also applies to an apprentice lineworker or person permitted to carry out class D linework under the effective supervision of a class D lineworker. **Conditions of extended application** The extended application of this exemption is subject to: (i) the exempt person complying with conditions (a) and (b) set out above; and (ii) the exempt person carrying out the electrical installation work under the effective supervision of a licensed lineworker who also complies with the conditions (a) and (b) set out above.

Column 1 – Exempt Person	**Column 2 – Exemption**
NEUTRAL INTEGRITY AND POLARITY TESTING	
18. Person who is a class D lineworker or class C lineworker or meter mechanic or meter technician	Sections 36 and 38(a) of the Act do not have effect in relation to an exempt person who disconnects or reconnects a consumer mains or submains neutral conductor for the purpose of conducting neutral integrity and polarity testing in accordance with the VESI Connection Manual. **Conditions** This exemption is subject to the worker – A. being authorised by the MEC that supplies or is to supply electricity to the electrical installation to carry out the testing or its network infrastructure company; and B. holding a certificate from the MEC or its network infrastructure company stating that it is satisfied the exempt person is competent in the VESI Connection Manual requirements and has satisfactorily completed – (a) training in the current nationally recognised competency standard unit for the performance of testing of connections to low voltage electricity networks; and (b) training and a practical assessment in the safe disconnection and reconnection of consumer mains and submains neutral conductors..

Dated 22 December 2020
Responsible Minister:
THE HON LILY D'AMBROSIO MP
Minister for Energy, Environment and Climate Change

CLAIRE CHISHOLM
Clerk of the Executive Council

5.5 ESV Safety Alert

Electrical Safety Alert

Failing to perform and identify correct polarity and not proving safe to touch can kill

Safety alert

Background

Energy Safe Victoria has issued this safety alert to warn of the danger of failing to conduct electrical tests to confirm correct polarity when connecting supply to installations, installing and making changes to metering equipment and working on low voltage network assets.

This safety alert has been re-issued following a number of reported reverse polarity incidents (transposed active and neutral conductors) supplying installations and others associated with connections to overhead mains conductors. These included transposed overhead service connections and transposed connection from a transformer to the low voltage overhead network and wiring at the meter location.

Safety issues

A reversed polarity applied to an installation and the network creates a potential life threatening situation to customers or to anyone who contacts conductive poles and exposed metal points connected to the installation's main earthing system. This may include the metal meter enclosure, metal plumbing fixtures and the earthed frame of power tools and appliances.

The increased installation of customer embedded generation within installations now creates an additional electrical safety risk, as there may still be voltage present at switchboards when the distribution supply is disconnected.

Managing the safety issues

This raises the importance for workers to test before they touch wiring at the meter boards to ensure their own safety as detailed in the Victorian Electrical Supply Industry (VESI) Installation Supply Connection Tests and Procedures.

These procedures detail the tests required by distribution workers when connecting supply to installations in Victoria and each distribution business has its own procedures to ensure the correct connection of network assets. It is crucial workers complete the appropriate tests and follow procedures when connecting or reconnecting supply to customers' installations.

Likewise, it is equally important for licensed electrical workers to ensure network connections are completed correctly to ensure safety to all.

Distribution businesses must ensure that safe systems and procedures are effectively implemented to ensure service and network connections are completed correctly to protect Victorians.

Safety must never be compromised and workers and businesses must adhere to safe working procedures.

VICTORIA State Government

energysafe VICTORIA

Legal obligations

Distribution businesses have a legal duty to minimise as far as practicable the hazards and risks to the safety of any person arising from their supply network. Licensed electrical workers also have an obligation not to install electrical equipment in a manner that will be unsafe when connected to electricity supply.

Energy Safe Victoria will investigate reverse polarity incidents and may take enforcement action if the above duties and obligations are found to have been breached.

Who we are

We are Victoria's safety regulator for electricity, gas and pipelines.

Our role is to ensure that Victorian gas and electricity industries are safe and meet community expectations. We are also responsible for licensing and registering electrical workers, and educating the community about energy safety.

More information is available on the Energy Safe Victoria website: www.esv.vic.gov.au