INSTALLATION SUPPLY CONNECTION TESTS & PROCEDURES

June 2017

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

- **CitiPower Pty Ltd**
- **Jemena Electricity Network**
- **Powercor Australia Ltd**
- **AusNet Services**
- **United Energy**

INSTALLATION CONNECTION TESTS & PROCEDURES COMMITTEE

Ref: VESI Installation Supply Connection Tests & Procedures (ISCTP) Manual Update – 1/6/2017

Date: 26/05/2017

To Distribution Businesses/Stakeholder

Following consultation and agreement between the VESI ISCTP committee and all Distributors, the VESI Installation Supply Connection Tests & Procedures Manual has been updated.

The June 2017 version of the manual will be accessible for download and hard copy printing from the VESI website from the 1st of June 2017.

Managers of personnel who use the VESI ITCP manual are to ensure:

- All stakeholders are made aware of these changes, and
- All personnel approved to undertake VESI ICTP procedures have access to the current version of the manual either electronically or in hard copy.

Major Changes to the Manual Include:

- New procedure 4.11A, Replacement or Disconnection and Reconnection Underground Service <100A Single Occupancy– Service cable "On or Off Supply
- New procedure 4.11B Replacement or Disconnection and Reconnection Underground Service <100A Multiple Occupancy– Service cable "On or Off Supply
- New procedure 4.11C Replacement or Disconnection and Reconnection Underground Service >100A Single or Multiple Occupancy Disconnection
- New IR Test result figure of 5 Meg Ohms for existing or repaired underground consumer's mains.
- Updated existing procedure 4.13 Overhead Service Replacement, Fuse at Pole End. Updates include identification of personnel approved to undertake the task and minor changes to the procedure.

The **Change Summary** table below (copied from Section 1 of the Manual) lists the most recent changes to the June 2017 version of the Manual.

Bill Beirouti
Chairman
VESI Installation Supply Connection Tests & Procedures Committee

VESI ISTCP Management Committee

Change Summary	Section
Removed pre 2016 manual version “Summary of Changes” from new manual	1
Updated membership and chair of the committee	1.4
Underground consumer mains cable fault – Minimum IR test value of 5 Megohm added for reconnected UG mains	3.4
Included new step 10 “Remove ancillary equipment fuses…”	4.6
Public lighting re titled Public Lighting -With Switchboard Public Lighting -Without Switchboard	4.9 4.10
New procedure:--Replacement or Disconnection and Reconnection Underground Service <100A Single Occupancy– Service cable “On or Off Supply”	4.11A
New procedure:- Replacement or Disconnection and Reconnection Underground Service <100A Multiple Occupancy– Service cable “On or Off Supply”	4.11B
New procedure:- Replacement or Disconnection and Reconnection Underground Service >100A Single or Multiple Occupancy	4.11C
Procedure now identifies personnel approved to undertake the task. Actual procedure now only applicable where disconnection of neutral is required to be undertaken at the customer switchboard. Diagrams removed as they only reflected multiple occupancy installations	4.13

Section 1.

General

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

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1.1 Contents

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1.2 Changes Summary

Date	Summary of Changes	Section
Jan 2016	Update Administration Section 1:- to reflect changes in committee personnel, Distribution business titles	1.4 1.12 1.13
Jan 2016	Rewrite of Authorisation clause with reference to VESI STRC guidelines	1.10
Jan 2016	Included photo of new model Dewar NST M1120 with digital display	2.3
Jan 2016	Included photo of 50m Haycolec trailing lead	2.4
Jan 2016	Test Procedures - Removed note permitting NST test in lieu of polarity test on single phase installations. i.e polarity test required prior to NST test on all installations	3.5 3.7
Jan 2016	Included additional picture of check test in Test procedures at an UG installation	3.6
Jan 2016	NST test procedure – referenced digital display output where a digital NST is used.	3.7
Jan 2016	Updated diagram of Check Test in UG service connection AND added wording at step 3 re test of consumers mains required only when positive identification of Consumer Mains can't be made	4.5
Jan 2016	Underground Supply -Over 100amps retitled and rewritten "Supply Connections Greater than 100amps:- Overhead and Underground" for both new and existing installations	4.6
Jan 2016	Abolishment Procedure – added the wording at step 12 to re test conductors for de-energised. Also in procedure & pictures	4.16
Jan 2016	Fault finding chart M1110 added to title. Updated the Hints comments in fault finding to reference to Section 1 Clause 1.10 Administration that identifies the requirements of personnel for connection work /fault rectification in lieu of Code of Practice on electrical safety (Green Book)	5.2A
Jan 2016	List of DEWAR digital NST M1120 LCD screen displays and basic information.	5.2B
Jan 2016	Included overview paragraph to the Order in Councils amendments to the Electricity Safety Act 1998 with the Order in council G17 that was the base for the subsequent Orders -extracts of G36 G33 provided	5.5

Date	Summary of Changes (cont)	Section
June 2017	Removed pre 2016 manual version "Summary of Changes" from new manual	1
June 2017	Updated membership and chair of the committee	1.4
June 2017	Underground consumer mains cable fault – Minimum IR test value of 5 Megohm added for reconnected UG mains	3.4
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June 2017	Public lighting re titled Public Lighting -With Switchboard Public Lighting -Without Switchboard	4.9 4.10
June 2017	New procedure:--Replacement or Disconnection and Reconnection Underground Service <100A Single Occupancy– Service cable "On or Off Supply"	4.11A
June 2017	New procedure:- Replacement or Disconnection and Reconnection Underground Service <100A Multiple Occupancy– Service cable "On or Off Supply"	4.11B
June 2017	New procedure:- Replacement or Disconnection and Reconnection Underground Service >100A Single or Multiple Occupancy	4.11C
June 2017	Procedure updated with approved personnel identified to undertake the task. Diagrams removed as they only reflected multiple occupancy installations	4.13

1.3 Definitions

The definitions contained herein apply to these Installation Supply Connection Tests and Procedures and may vary from definitions contained in other documents.

Alive – 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.

Conductor – means a wire, cable or form of metal designed for carrying electrical current**.**

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

Consumer's Terminals – means the junction at which the consumer mains connects to the Distributor's service cable or supply main conductors.

Customer – means the person or body which requires electricity to be made available to an electrical installation on a property, and includes the owner, occupier or tenant as the case may require or a group of bodies acting as one in the provision of electricity to their property.

CT – means current transformer

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

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 break in the incoming and/or outgoing mains neutral conductor or connections, including a direct physical force on the incoming and/or outgoing mains neutral conductor terminals or connections.

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 within an electrical installation, and servicing 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 Service Disconnection Device.

FOLCB – means Fused Overhead Line Connection Box.

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

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.

LEIW – means Licensed Electrical Installation Worker as issued by Energy Safe Victoria (ESV).

"Electrician's" qualifications - means a holder of an "Electrician's" licence

"Inspectors" qualifications - means a holder of an "Inspector's" licence

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.

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 Overhead Electric Line (POEL) – all components. of any private electric line that is constructed as aerial wiring system

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.

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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 SIRs now refers to a SPD as a Supply Protection Device

Shall – is to be understood as mandatory.

Should – is to be understood as non–mandatory, i.e. advisory or recommended.

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

1.4 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 and United Energy.

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: Bill Beirouti (Chairman, CitiPower), Wayne Kelly (United Energy), Peter O'Neill (Jemena), Peter Mobbs (AusNet Services) and Greg Payne (Secretary, Powercor).

1.5 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.

1.6 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.

1.7 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

1.8 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

1.9 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.

1.10 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.

1.11 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.

1.12 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.

CitiPower, Jemena Electricity Networks; Powercor Australia, AusNet Services and United Energy each expressly disclaim any liability, joint or several, to anyone including, without limitation, any end–user of this document, in respect of anything done by them in reliance in whole or in part upon the contents of this document.

1.13 Copyright

Section 2.

Testers & Equipment

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

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2.1 Contents

2.2 Test Equipment Maintenance

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

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.

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2.3 Testers

Voltage Indicator

Neon Type Testers

Audible Testers

Ezyvolt Tester

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 240V source.
- Conduct continuity test using:
  - Self test function on Audible Voltage Indicators
  - Insulation Resistance and Continuity Tester set on 500 V scale.

Maintenance

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

Testers (Continued)

Neutral & Supply Tester

M1110 series

M1120

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.

NST Electronic Model

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.

Testers (Continued)

Insulation Resistance and Continuity 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.

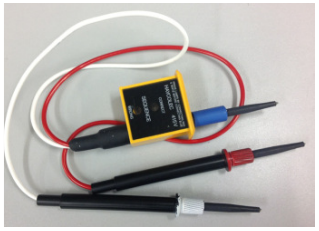
To test the operation of instrument and leads test as follows:

- 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.

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

Maintenance - General Care

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 close proximity of test location eg meter boxes.

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2.4 Test Equipment

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

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

Test Equipment (Continued)

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

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

2.5 Connection Equipment

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
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
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

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2.6 Meter Programmers

Pic Programmer	Application
	Program tariffs for Nilsen EMS meters /time switches **Maintenance** General care, replacement of batteries and re-programming to match required tariffs.

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2.7 Neutral Tags

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.

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 an Fused Overhead Connection Box 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, eg, 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.

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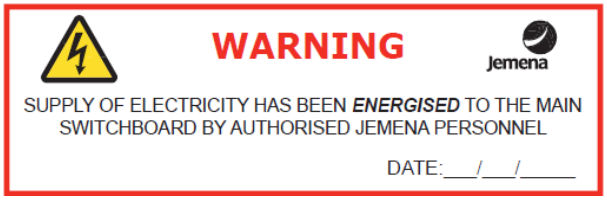
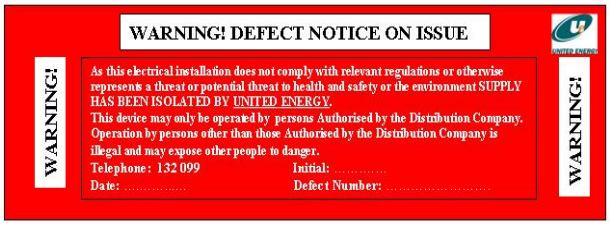
2.8 Labels

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



Caution Supply connected

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



Defect on Issue

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

CitiPower/Powercor

Warning Label

Typical Application:
Used on meter panels and meters to deter interference to seals and metering equipment

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Section 3.

Test Procedures

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

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.**

3.1 Contents

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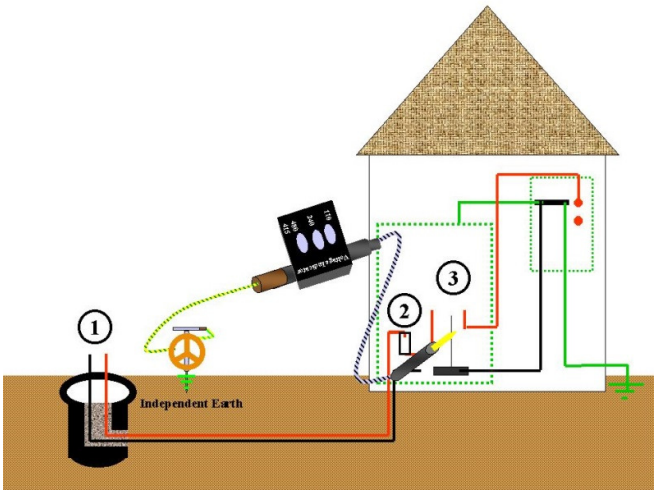
3.2 Test for De-Energised

Purpose	**Equipment Required**
To prove that apparatus to be worked upon is de-energised prior to the commencement of work on the apparatus.	➢ Voltage Indicator ➢ Independent Earth
Method	**Results**
1. Install independent earth, connect voltage indicator to independent earth: *(at least 2m from from any installation earths, water pipes and conductive structures - Refer Section 2.4).* 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.	Zero volt reading to be obtained.

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**

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3.3 Neutral Integrity Test Point (NITP) – Test

Purpose	**Equipment Required**
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	➢ Insulation Resistance and Continuity Tester ➢ Trailing Lead, where required

Neutral Integrity Test Points

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

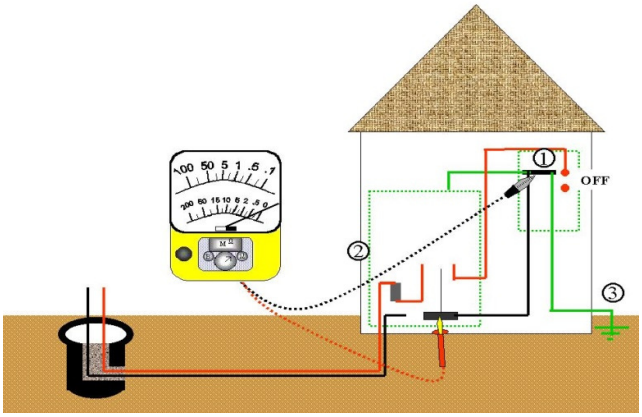
(Acceptable test points are shown numerically in diagrams below)

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

Method	**Results**
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.	Resistance of 0.5 Ohm or less

TYPICAL & ACCEPTABLE NEUTRAL INTEGRITY TEST POINTS

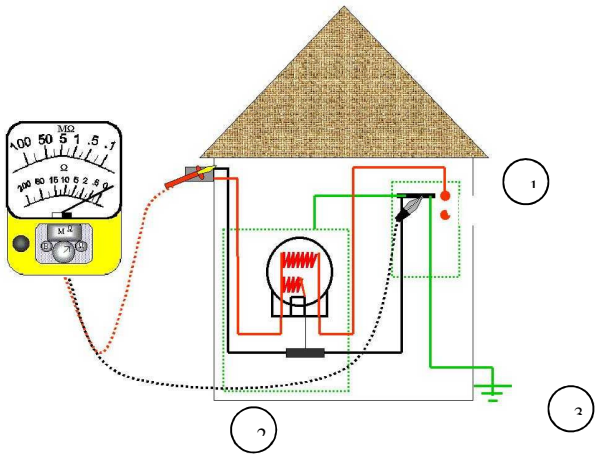
Underground Supply



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

TYPICAL & ACCEPTABLE NEUTRAL INTEGRITY TEST POINTS cont

Overhead Servicing – New /Replacement



Trailing Lead Method –

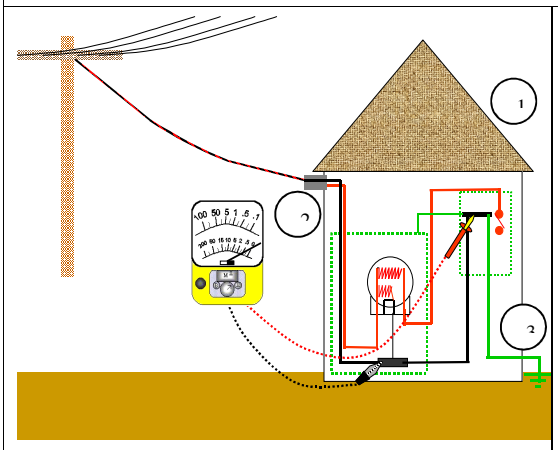
Neutral Integrity Test Point test is conducted from the consumer's mains neutral in the FOLCB to the identified acceptable NITP

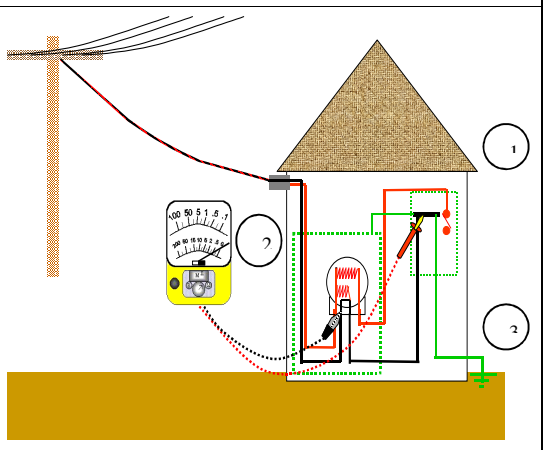
Note: NITP testing involving the FOLCB shall only be undertaken when the FOLCB is completely isolated

Note: NITP testing involving the FOLCB shall only be undertaken when the FOLCB is 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.





Neutral Integrity Test Points cont.

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.

New Installation*:-*

Test points for new installations are the;

- **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

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

Underground Service repair/replacement – Multiple Occupancy

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

Neutral Integrity Test Points cont

Direct Metering Alteration and/or Addition – Multiple Occupancy

Existing Installation:-

Neutral Not Disturbed

Acceptable test points for work on existing Multiple Occupancies where the main or occupancy neutral is not disturbed are :

- **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 switch board or neutral link on the meter panel.

Further clarification on NITP location and methods to establish the valid NITP on particular types of Multiple Occupancies may be found in the individual connection procedure 4.14A

Neutral Disturbed

Acceptable test point for work on existing Multiple Occupancies where the main or occupancy neutral is disturbed is:

- **Neutral bar at the occupancy switchboard**

OR

- **MEN bar at the occupancy switchboard (Only where an independent earth can be established {Appendices 5.3 not applicable})**

Further clarification on NITP location and methods to establish the valid NITP on particular types of Multiple Occupancies may be found in the individual connection procedure 4.14B

NOTE: If an Independent earth is unavailable, refer to Appendices 5.3 of these Procedures

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. Establish Earth Reference.-(refer **Note)**
2. Ensure consumer mains conductors are separated from each other and any other conductive material.
3. Select the 500 V M/Ohm 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

Insulation Resistance	
Conductor Length	*Result*
Up to 50 m	Not less than 50 Meg Ohm
Greater than 50m	5 Meg Ohm reduction for each 25 m over 50m
Must not be less than 5 Meg Ohm regardless of length.	
Continuity Test/s	
Conductors Bridged	Less than 0.5 Ohm
Bridge Removed	Open Circuit

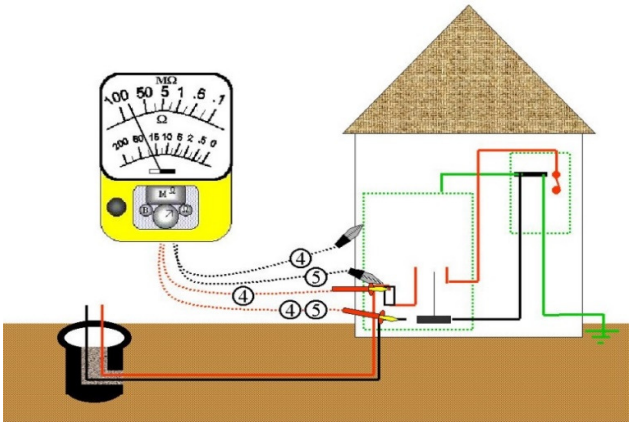
Results – Existing Consumer's Mains

For reconnection of existing mains or repaired mains, the IR test result shall be a minimum of 5 Meg Ohms. Where this value cannot be obtained, refer to individual Distributor Procedures.

Typical Insulation Resistance Testing (Steps 4 & 5)

4. Test each consumer's mains conductor to the established Earth Reference.

5. Test between all consumer's mains conductors.



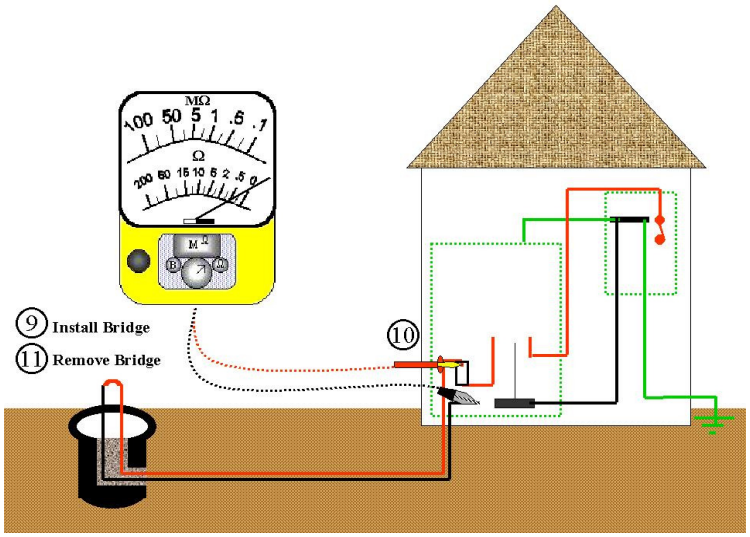
Underground Mains Testing… cont

Typical Continuity Testing Steps (9,10 & 11)

9. Bridge one end of the consumer's mains neutral conductor and active conductor.

10. Test continuity of consumer's mains.

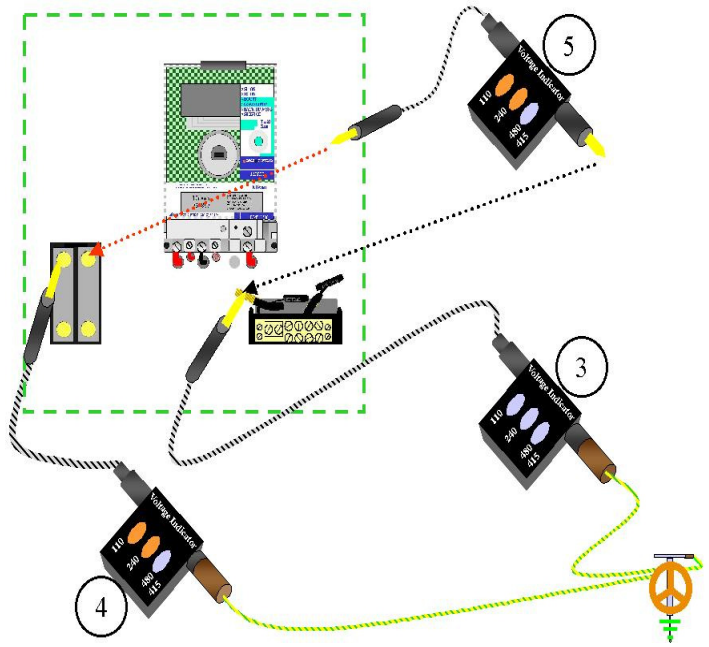
11. Disconnect bridge and re-test



3.5 Polarity Test

Purpose	**Equipment Required**
To prove the supply neutral is not connected to an energised active conductor and the supply active/s are connected to the mains active.	➢ Voltage Indicator ➢ Independent Earth ➢ Neutral & Supply Tester (see Note)
Method	**Results**
1) Isolate Supply Conductors a. Supply active/s from installation active. b. Supply neutral from installation neutral. 2) Test the supply conductors as follows: 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 240 Volts 240 Volts 415/480 Volts

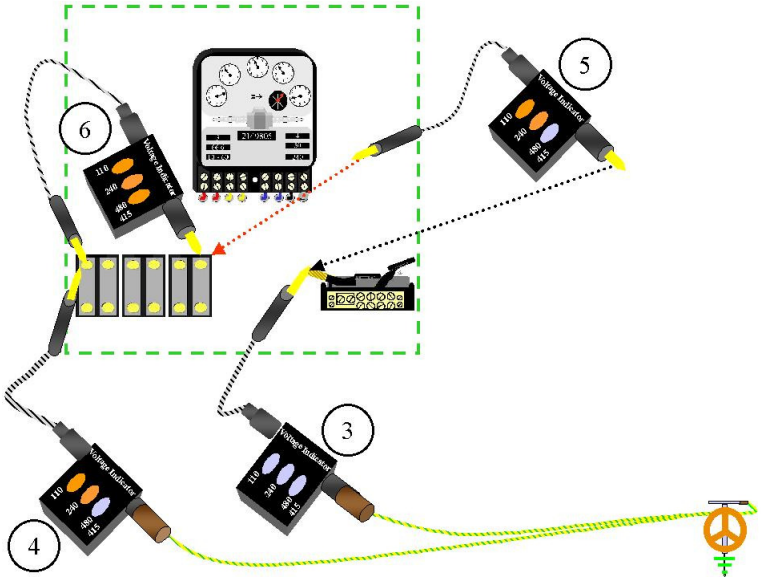
Typical Polarity Testing at Meter Position Single Phase (Steps 3 – 5)



3) Independent earth to supply neutral.
4) Independent earth to supply active.
5) Supply active to supply neutral.

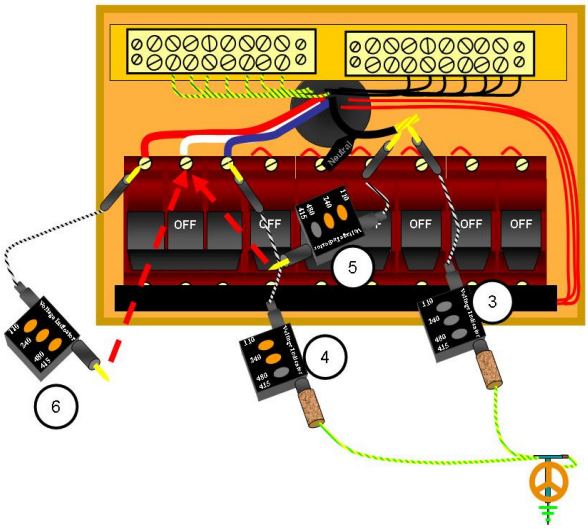
Polarity Test .. cont

Typical Polarity Test on a Multiphase Installation (Steps 3 – 6)



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 (Steps 3 – 6)



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.

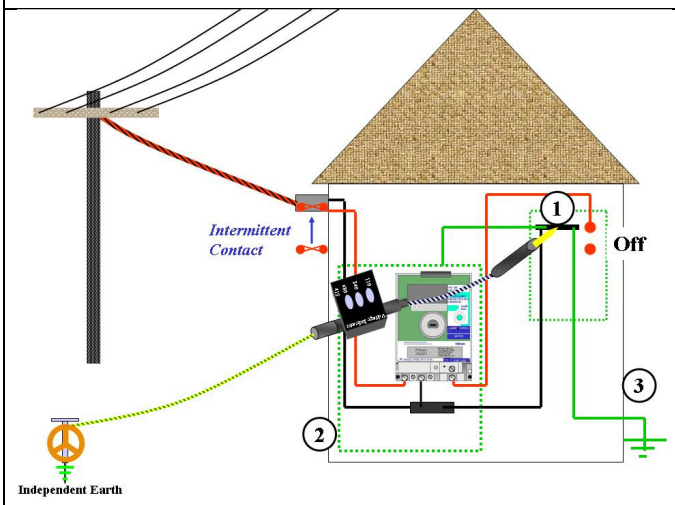
NOTES:
For *Single Person Check Testing – Trailing Lead Method*, a trailing lead is placed in series with the circuit at Point 1.

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).

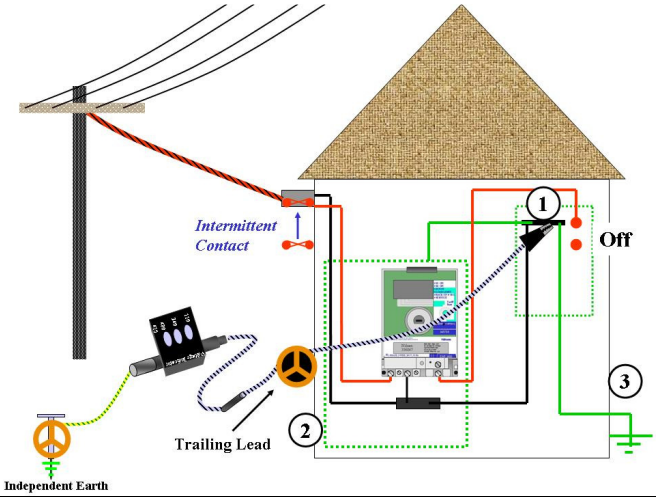


Arrangement Required

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).

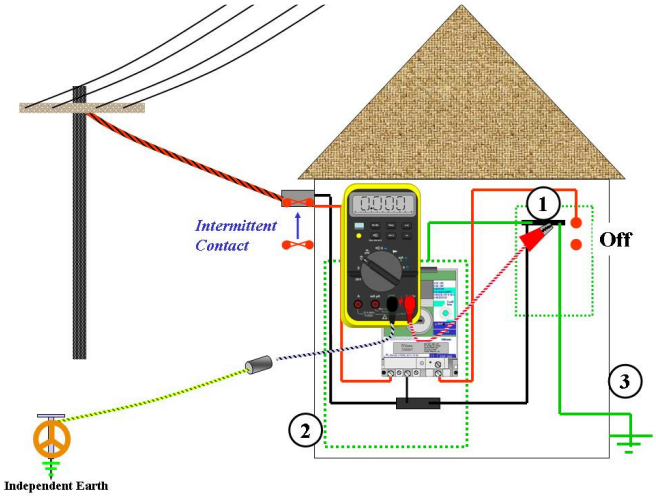


Arrangement Required

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).

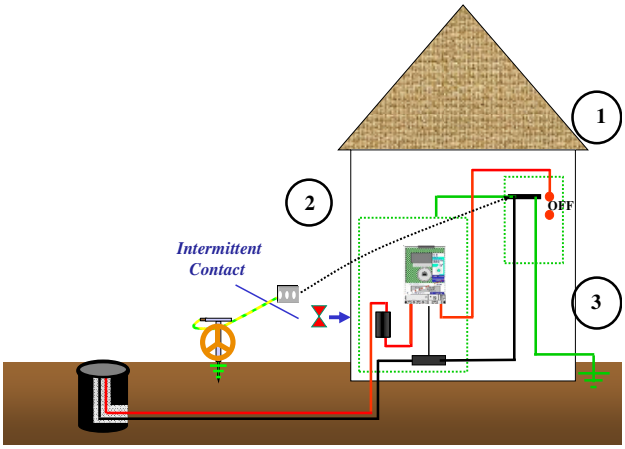


Arrangement Required

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

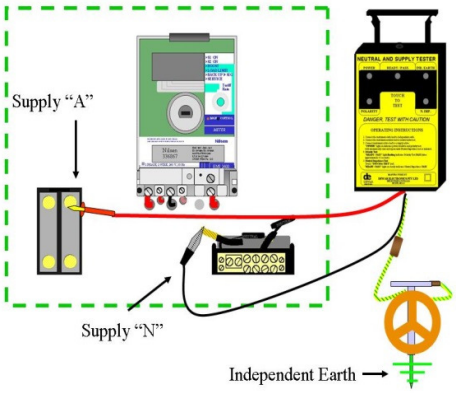
A trailing lead placed in series with the testing equipment is used to extend the testing circuit and allows for a single person to perform Check Testing.

Check Test is conducted to the previously established Neutral Integrity Test Point (NITP).

3.7 Neutral & Supply Test

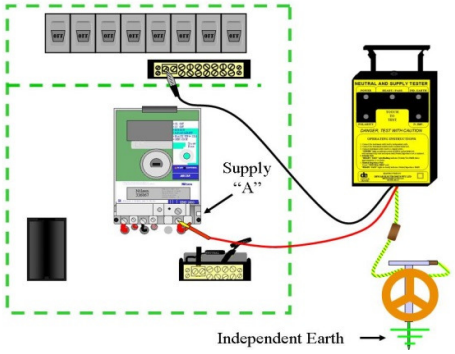
Purpose	**Equipment Required**
The purpose of testing with a Neutral & Supply Tester in accordance with these *Installation Supply Connection Tests & Procedures* is to demonstrate that the active and neutral connections from the network supply to the customers installation are correct.	➢ Neutral & Supply Tester ➢ Independent earth ➢ Trailing Leads where appropriate
Method Ensure test location is appropriately prepared. 1. Connect the instrument earth lead to the independent earth. 2. Connect the instrument neutral lead to the supply neutral. 3. Connect the instrument active lead to the supply active. **4. Polarity Test.** **5. 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



Neutral & Supply Test …cont

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 150 VAC "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 (eg. 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 & Supply & Test … cont

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.

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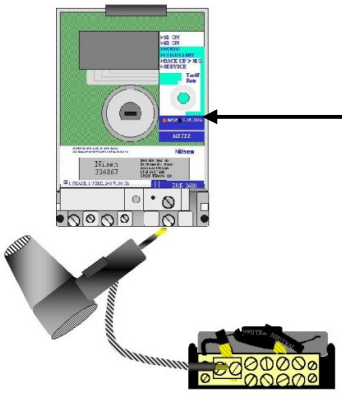
3. 8 Meter Load Test

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

Typical Load Testing on Meters



Early model electronic meter indicates consumption by a pulsing indicator

NOTE:-
Refer to Manufacturer/Distributor instructions that may apply to various makes/types of meters

Electro Mechanical meters indicate energy consumption by the rotation of the disc in the direction identified on the meter face.

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)

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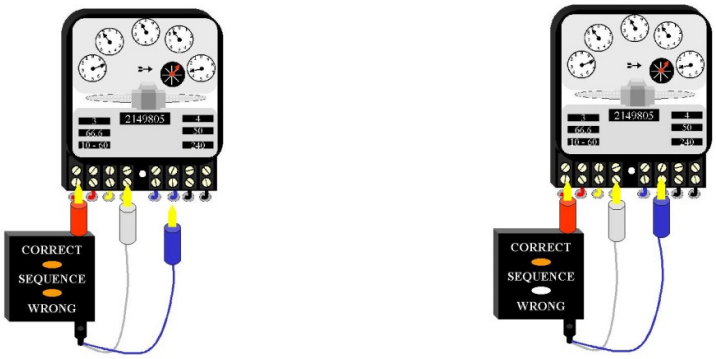
3. 9 Phase Sequence Test

Purpose	**Equipment Required**
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.	➢ 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 - Steps 2 & 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.

Phase sequence test …cont

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, ie:
a) Phase sequence determined at customer's end prior to disconnection eg. 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 eg. 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.

Section 4.

Connection Procedures

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

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4.1 Contents

4.2 Principles of Testing & Connection of Electrical Installations

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.

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 Ω 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.

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.

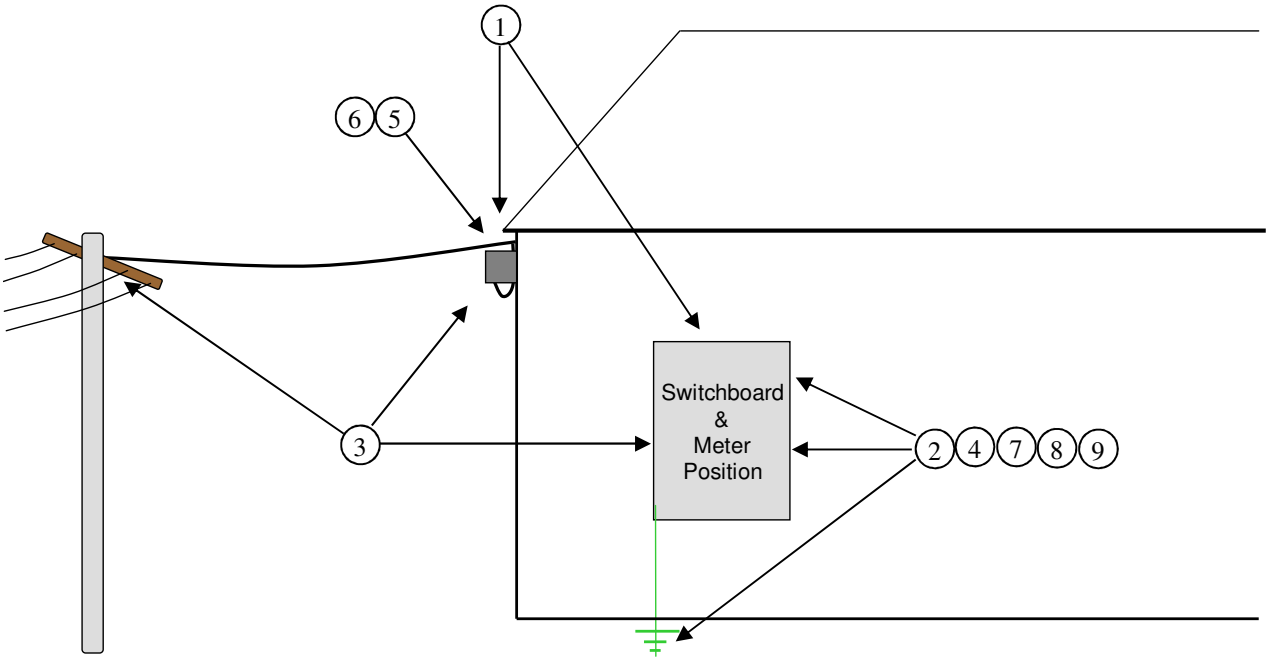
Check Testing: Section …… cont.

- 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

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.

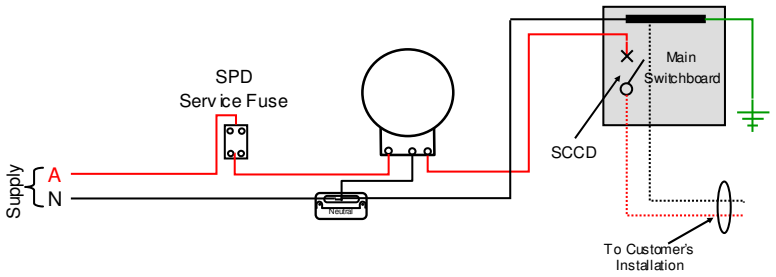
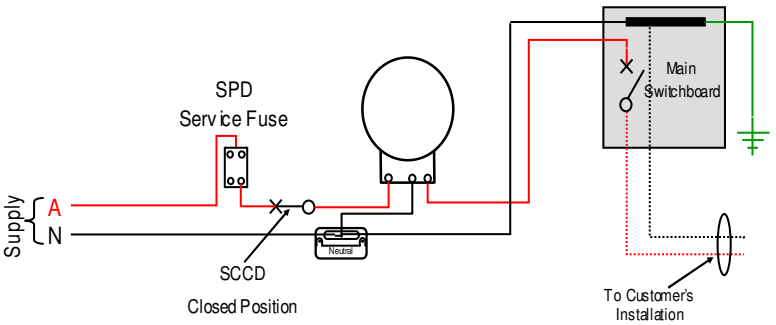
Location 2 Unmetered mains between the Service Protection Device (SPD) and the Metering Equipment.

Location 3 In the unmetered mains providing dual roles as the SCCD and SPD .

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:

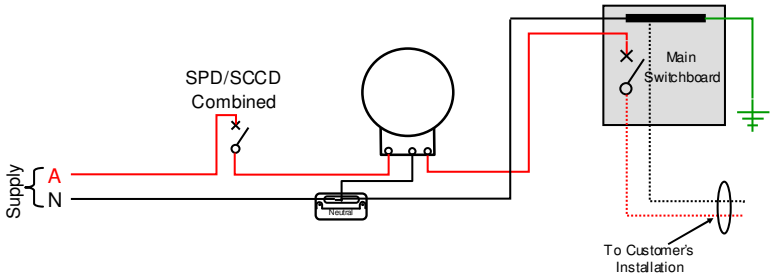
Typical Arrangements

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". ++
7. Identify consumer's incoming mains and all metered conductors and mark/tag incoming neutral conductor as appropriate.(Refer Section 2.7)
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 Consumers Mains Neutral.
21. Check Test/s (includes switched circuits) *
22. Leave service fuse/s inserted
23. NST Test to Neutral Integrity Test Point. *

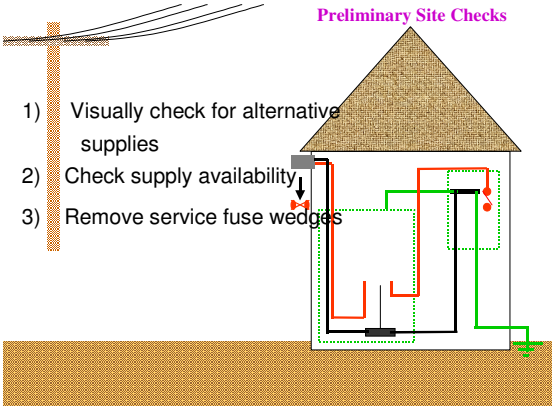
Meter Position

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.
++ Refer to "Supply Capacity Control Device/s" (Sect 4.3) if fitted.

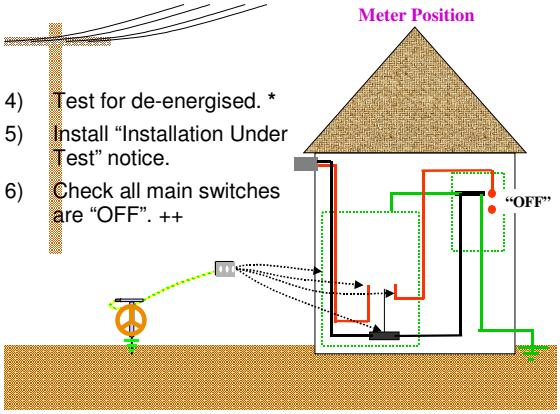
Preliminary Site Checks

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



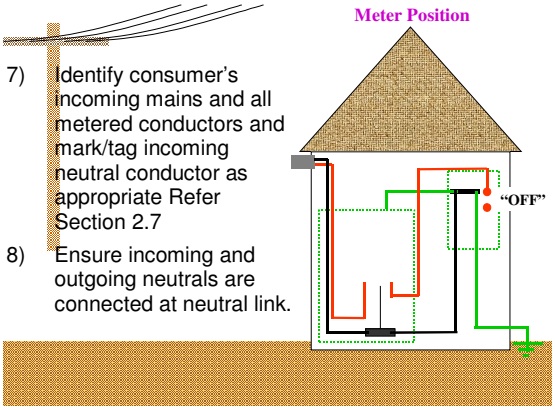
Meter Position

4) Test for de-energised. *
5) Install "Installation Under Test" notice.
6) Check all main switches are "OFF". ++



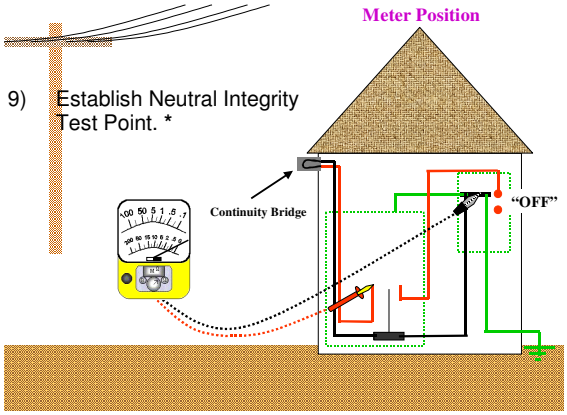
Meter Position

7) Identify consumer's incoming mains and all metered conductors and mark/tag incoming neutral conductor as appropriate Refer Section 2.7
8) Ensure incoming and outgoing neutrals are connected at neutral link.



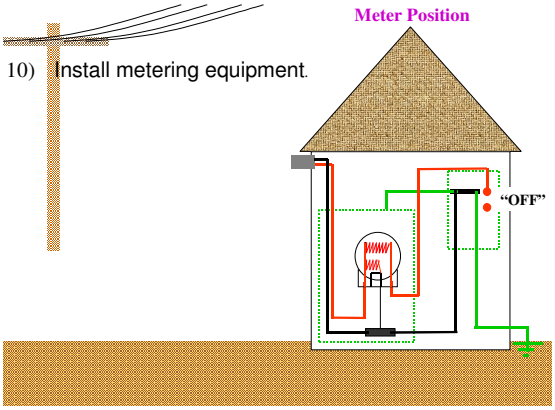
Meter Position

9) Establish Neutral Integrity Test Point. *



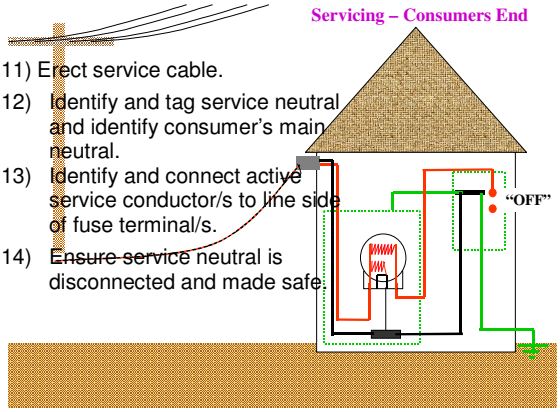
Meter Position

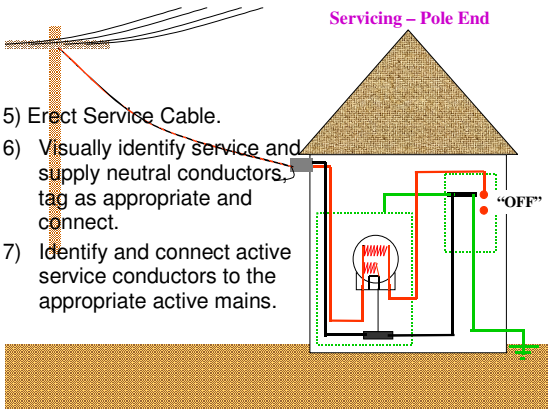
10) Install metering equipment.



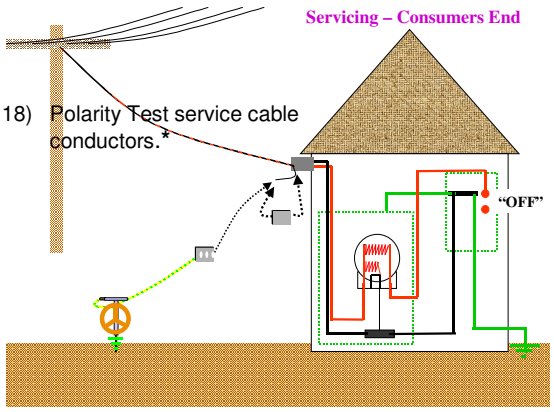
Servicing – Consumers End

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.

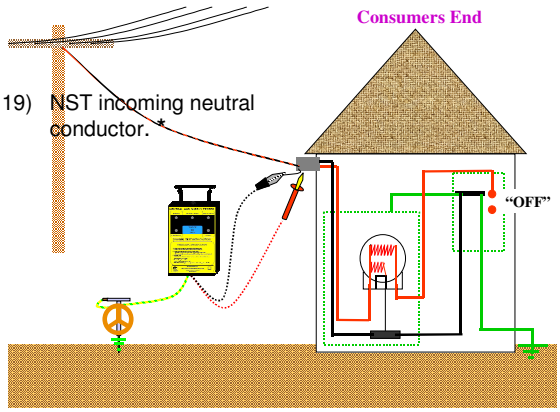




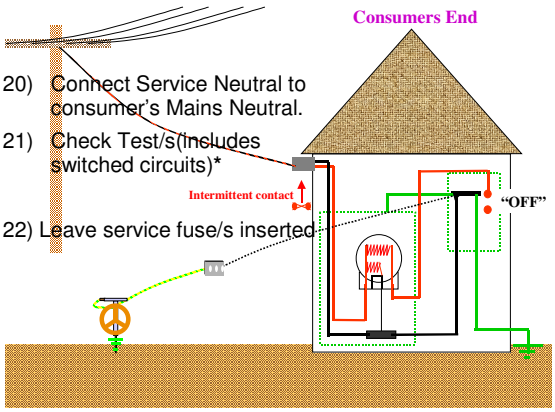
15) Erect Service Cable.
16) Visually identify service and supply neutral conductors, tag as appropriate and connect.
17) Identify and connect active service conductors to the appropriate active mains.



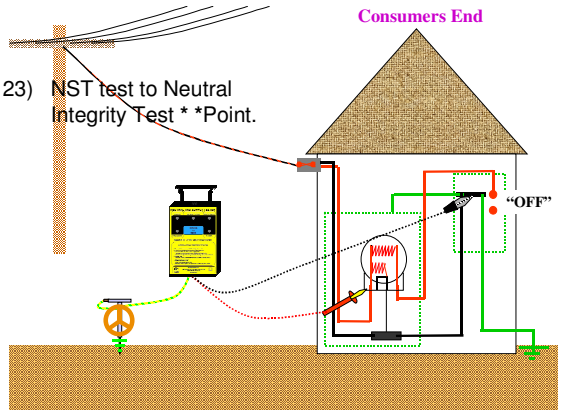
18) Polarity Test service cable conductors.*



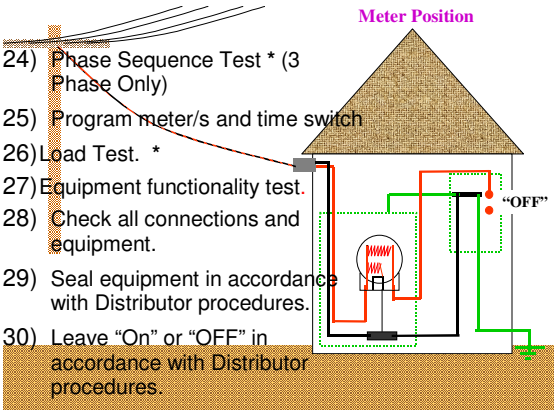
19) NST incoming neutral conductor. *



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.



24) Phase Sequence Test * (3 Phase Only)
25) Program meter/s and time switch
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.

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4.5 New Installation:- Underground Supply– Supplied from a Pit

Preliminary Site Checks

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

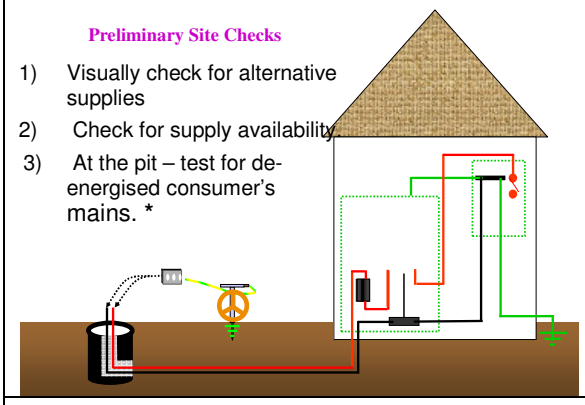
Meter position

16. Polarity Test all incoming consumers mains conductors. *
17. NST Test consumer's mains incoming 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 testing procedures.

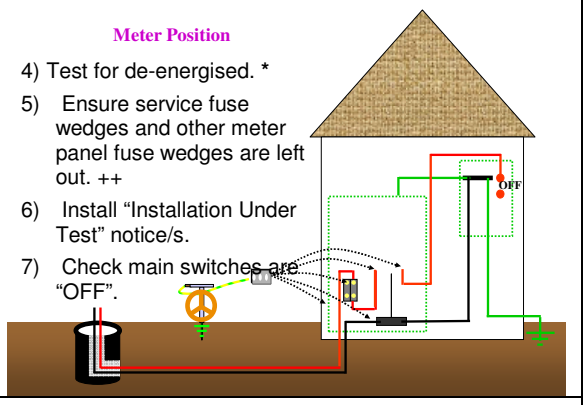
Preliminary Site Checks

1) Visually check for alternative supplies
2) Check for supply availability
3) At the pit – test for de-energised consumer's mains. *



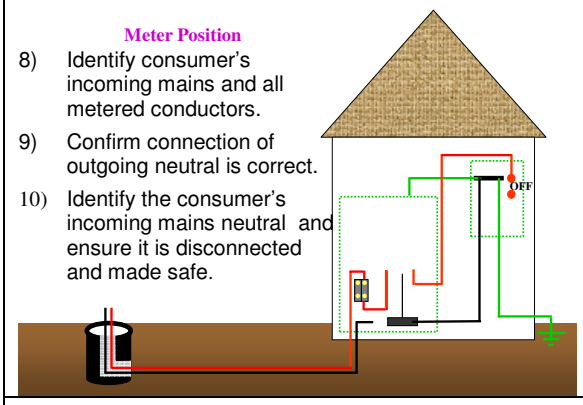
Meter Position

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".



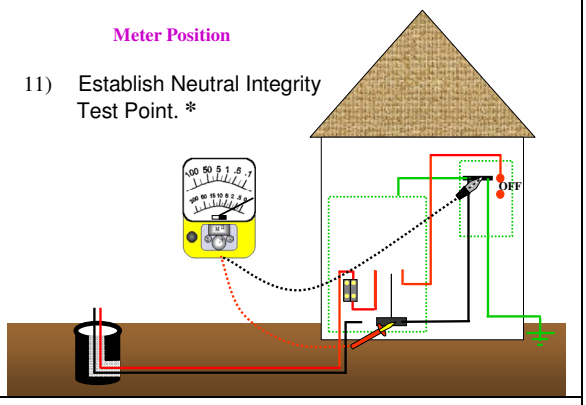
Meter Position

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.



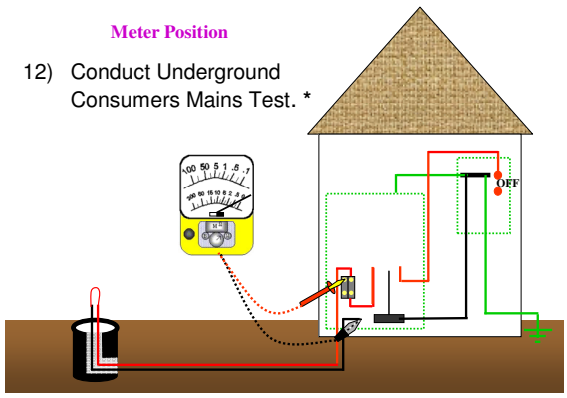
Meter Position

11) Establish Neutral Integrity Test Point. *



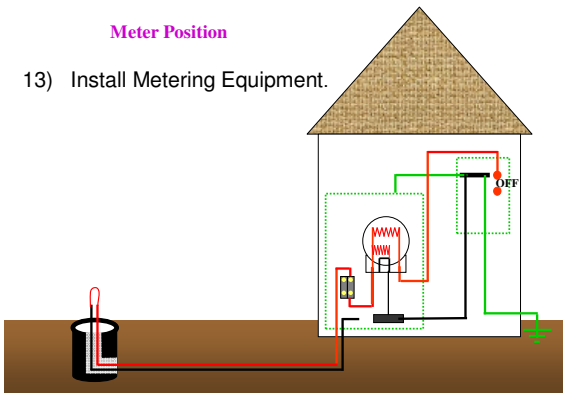
Meter Position

12) Conduct Underground Consumers Mains Test. *



Meter Position

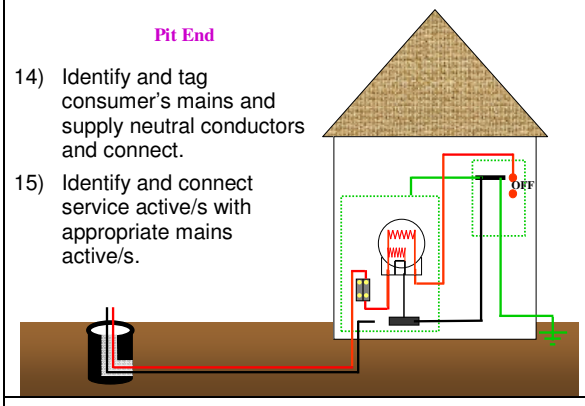
13) Install Metering Equipment.



Pit End

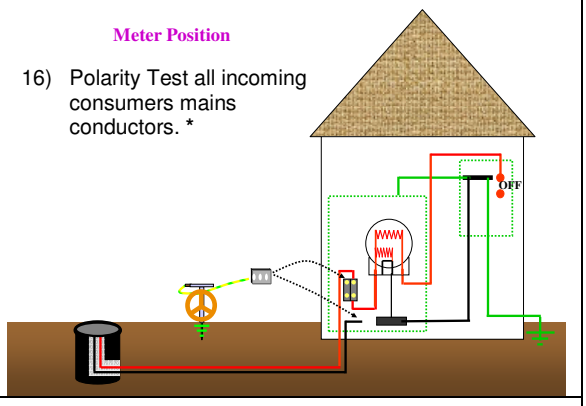
14) Identify and tag consumer's mains and supply neutral conductors and connect.

15) Identify and connect service active/s with appropriate mains active/s.



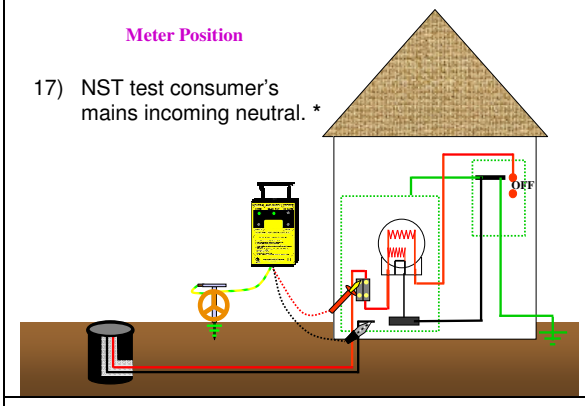
Meter Position

16) Polarity Test all incoming consumers mains conductors. *



Meter Position

17) NST test consumer's mains incoming neutral. *

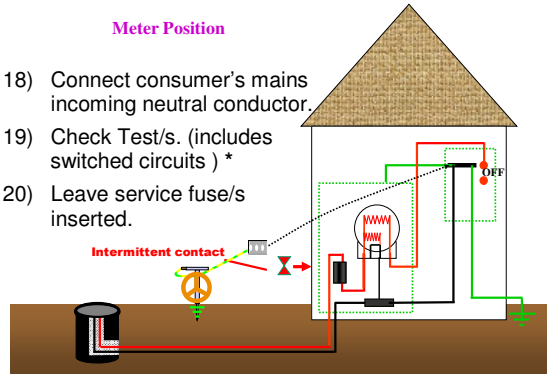


Meter Position

18) Connect consumer's mains incoming neutral conductor.

19) Check Test/s. (includes switched circuits) *

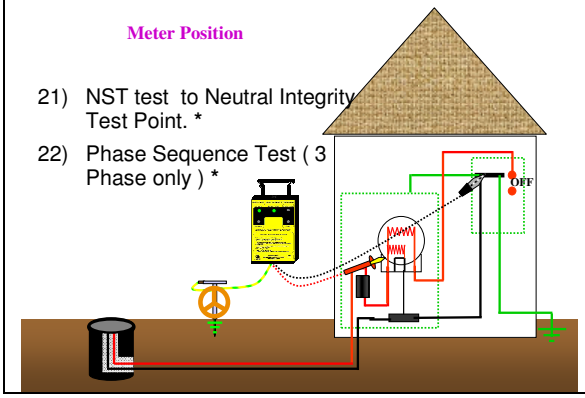
20) Leave service fuse/s inserted.



Meter Position

21) NST test to Neutral Integrity Test Point. *

22) Phase Sequence Test (3 Phase only) *



Meter Position

23) Program meters and time switch.

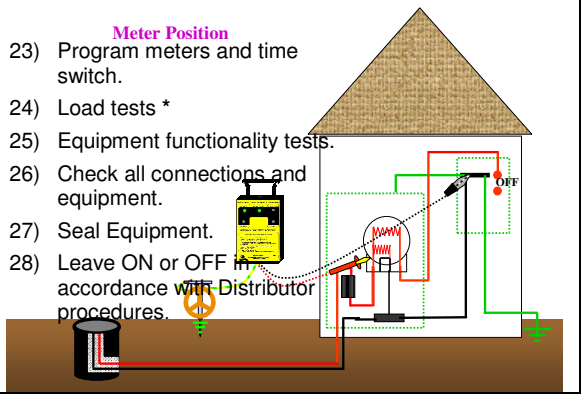
24) Load tests *

25) Equipment functionality tests.

26) Check all connections and equipment.

27) Seal Equipment.

28) Leave ON or OFF in accordance with Distributor procedures.



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

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.

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.

Unmetered 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.

Testing Principles and Definitions: Section..... cont

Main Neutral unable to be disconnected

Refer Note 2 below.

<u>Preliminary Site Checks</u> (all unmetered portions and remote main switchboards)

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

<u>Supply Point</u>

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).

<u>Point to be Connected / Switchboard / Meter position</u>

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. *

<u>Supply Point</u>

<u>For an underground connection:</u>

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.

<u>For an overhead connection:</u>

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.

Supply Connection greater than 100A Overhead or Underground……..cont

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 5.3) 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.

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4.7 New Installation:- Unmetered Supply- Not associated with Multiple Occupancies

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

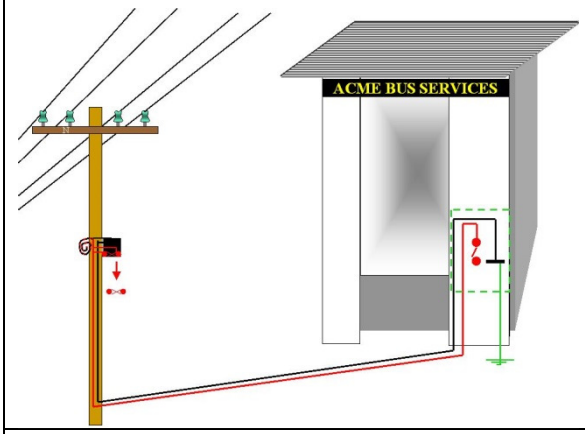
Consumers End – Switchboard

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 testing procedures.

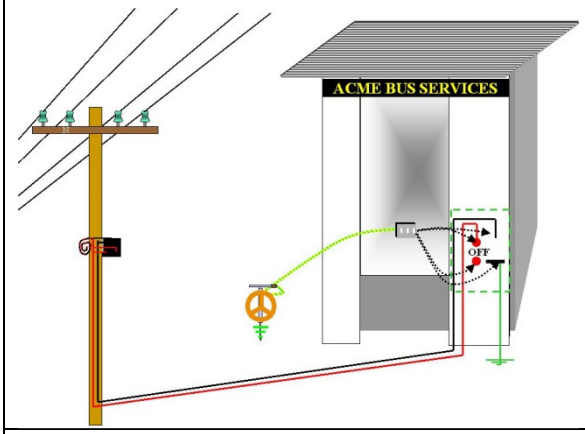
Unmetered supply- Not associated with Multiple Occupancies

Typical Arrangement



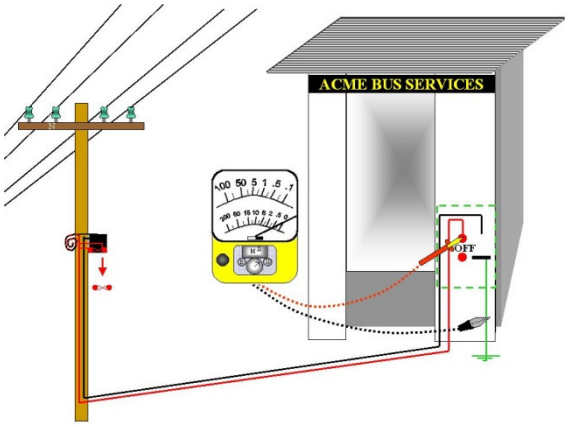
Preliminary Site Checks

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



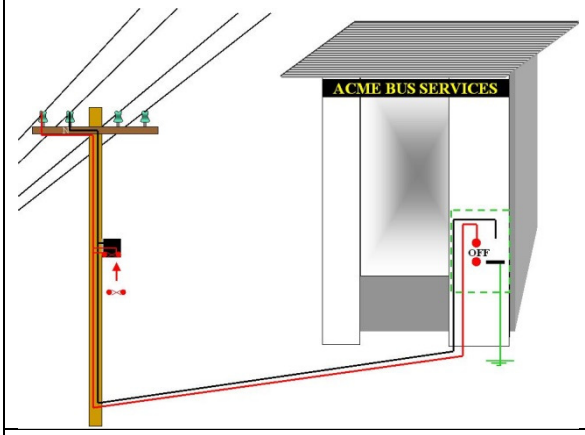
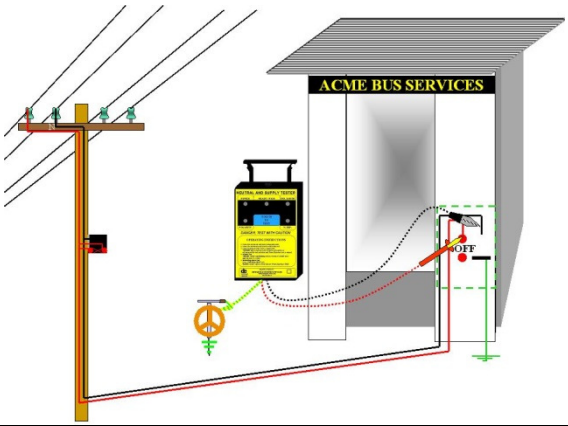
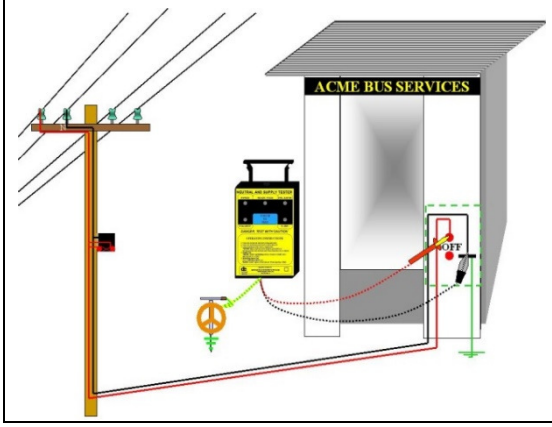
Consumers End - Switchboard

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.



Consumers End – Switchboard

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. *
	**Consumers End – Switchboard** 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.

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4.8 New Installation:- Multiple Occupancy- Direct Metered Occupancies

NOTES:_

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) **Unmetered 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.

UNMETERED SECTIONS:-

Preliminary Site Checks

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

Unmetered Sections ……. cont

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 5.3) should Independent Earth not be available

INDIVIDUAL OCCUPANCIES

Note 1 - Where there is a MEN at the individual occupancy switchboard, the procedure below does not apply. Refer to individual Distributor procedures.

Note 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

1. Visually check for alternative supplies.
2. Check Supply Availability.

Supply Point

3. Test for de-energised. ***** **++**
4. Install "Installation Under Test" notice.
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".

Occupancy Switchboard: Section……cont

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.

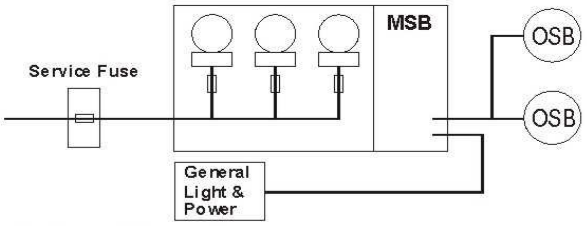
Occupancy Switch board

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.

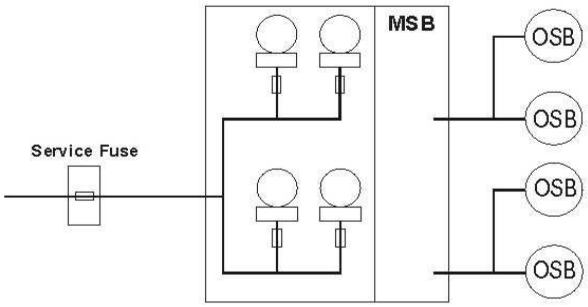
***** Refer to individual testing procedures

++ Refer to Appendix (section 5.3) should Independent Earth not be available for tests

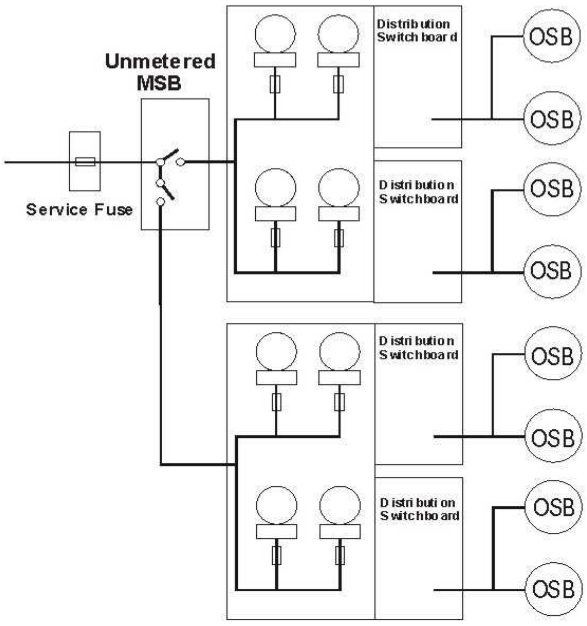
TYPICAL LAYOUTS FOR MULTIPLE OCCUPANCIES - DIRECT METERED



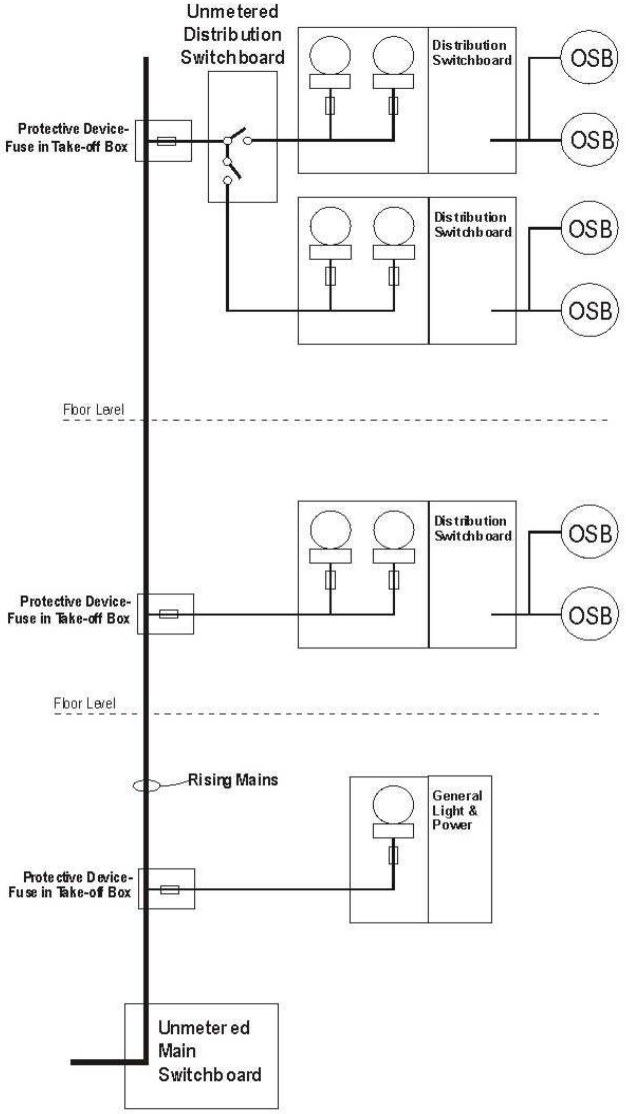
Two or More Occupancies
Plus General Light & Power
Single (Common) Meter Position



Two or More Occupancies
Single (Common) Meter Position



Two or More Occupancies
Multiple Meter Positions



High Rise
Multiple Meter Positions

The examples shown are typical only and, of course, many variations of these arrangements will be encountered

OSB Occupancy Switchboard

Multi Occ.cdr Rod Jeeks 10.02

4.9 New Installation:- Public Lighting– With Switchboard

Typical arrangement Lighting column shown

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. Confirm MEN terminal block, earth stud and earth rod connections are complete (as applicable).
8. Ensure lantern fitting/s and associated wiring is complete.
9. Ensure incoming supply active is appropriately isolated.
10. Tag the incoming lighting service neutral and ensure incoming neutral is disconnected and made safe.
11. Conduct Underground Consumers Mains Test on the lighting service conductors. *

Supply End

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

Lighting Column End

14. Polarity Test lighting service conductors. *
15. NST Test lighting service conductors. *
16. Connect service neutral to MEN terminal block.
17. Check Test to MEN terminal block. *
18. NST 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.

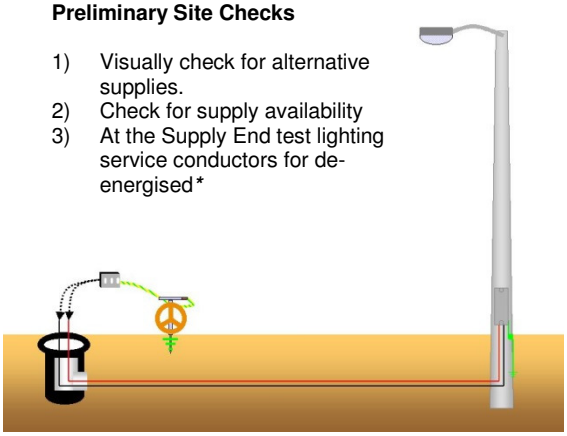
* Refer to individual test procedures.

Public Lighting - With Switchboard

Typical Arrangement Lighting Column shown

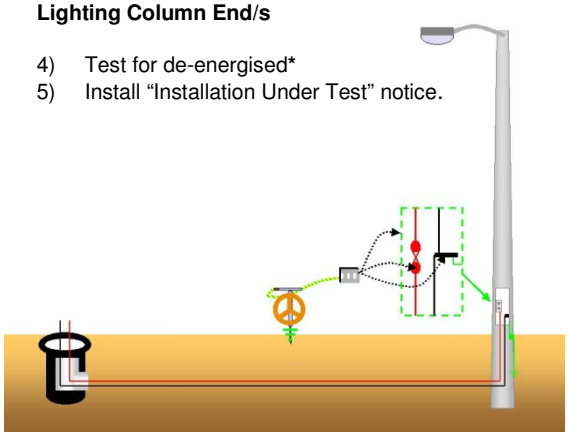
Preliminary Site Checks

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



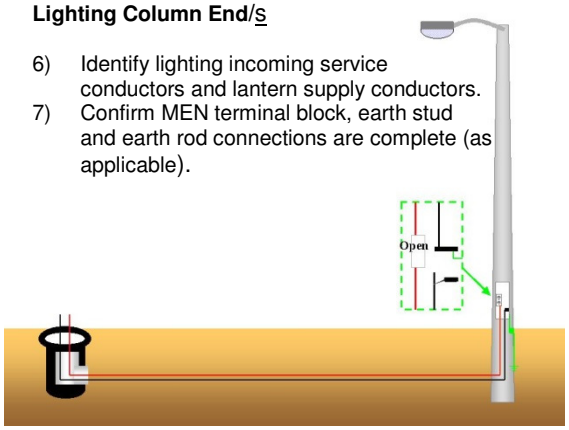
Lighting Column End/s

4) Test for de-energised*
5) Install "Installation Under Test" notice.



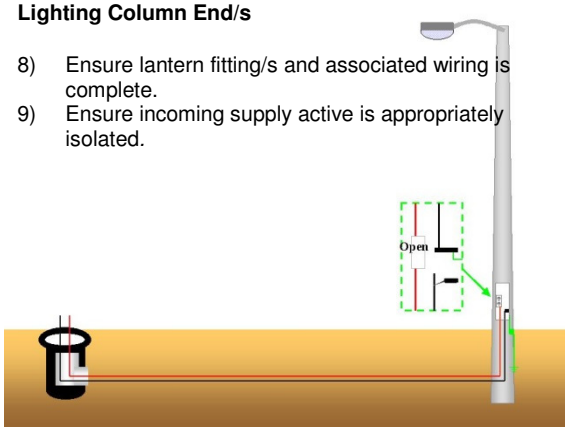
Lighting Column End/s

6) Identify lighting incoming service conductors and lantern supply conductors.
7) Confirm MEN terminal block, earth stud and earth rod connections are complete (as applicable).



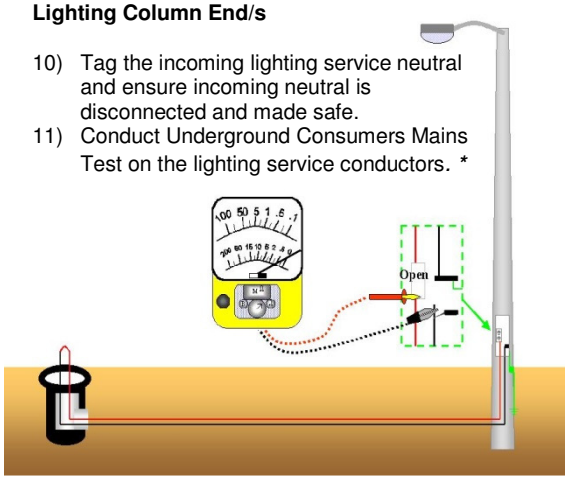
Lighting Column End/s

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



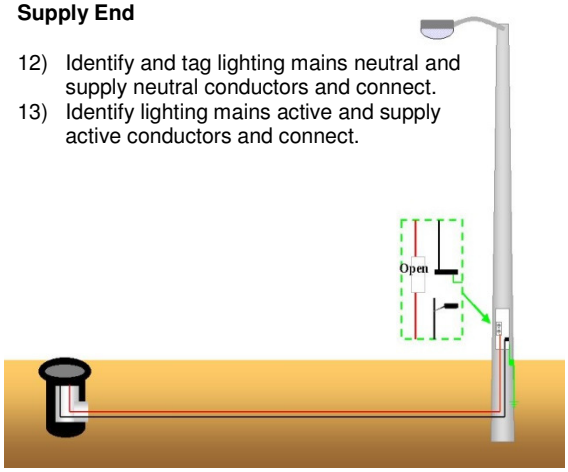
Lighting Column End/s

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



Supply End

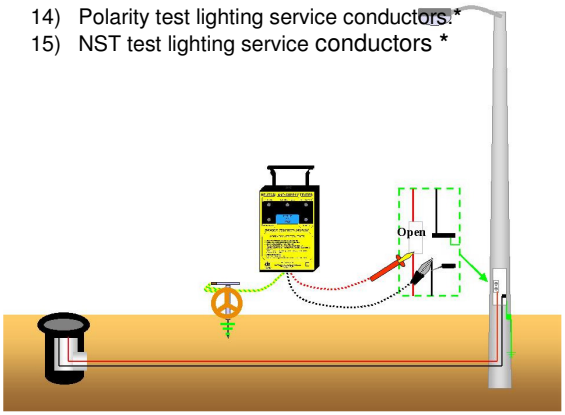
12) Identify and tag lighting mains neutral and supply neutral conductors and connect.
13) Identify lighting mains active and supply active conductors and connect.



Public Lighting - With Switchboard ……cont

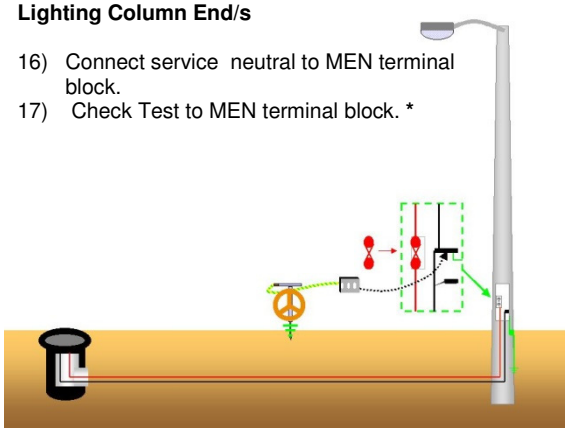
Lighting Column End/s

14) Polarity test lighting service conductors.*
15) NST test lighting service conductors *



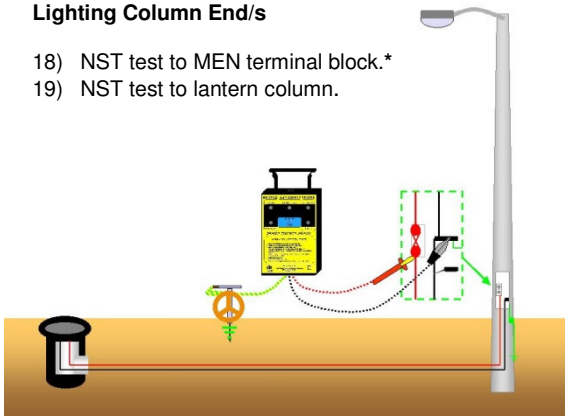
Lighting Column End/s

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



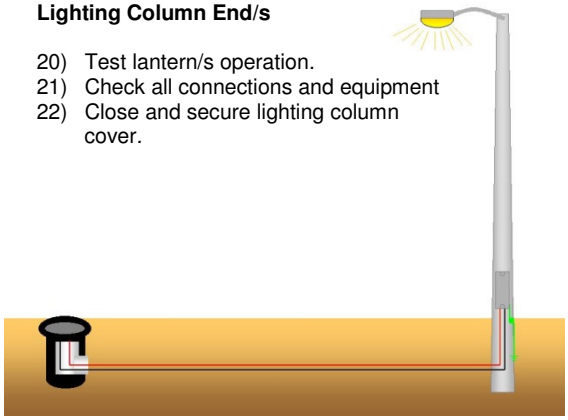
Lighting Column End/s

18) NST test to MEN terminal block.*
19) NST test to lantern column.



Lighting Column End/s

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



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4.10 New Installation:-
Public Lighting- Without Switchboard

Typical arrangement slip base/frangible column demonstrated

Preliminary Site Checks

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

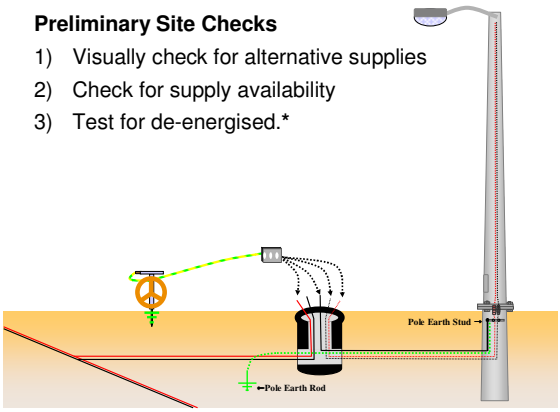
* Refer to individual test procedures

Public Lighting-Without Switchboard

Typical arrangement slip base/frangible column demonstrated

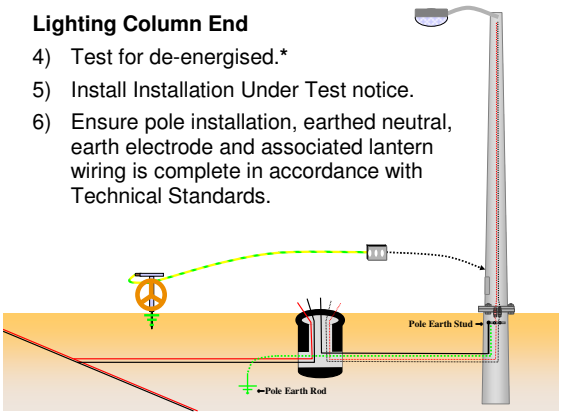
Preliminary Site Checks

1) Visually check for alternative supplies
2) Check for supply availability
3) Test for de-energised.*



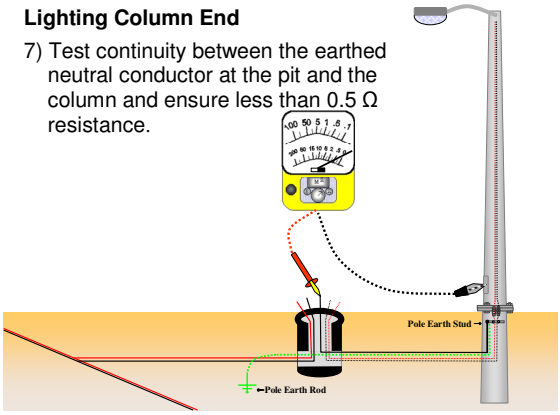
Lighting Column End

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.



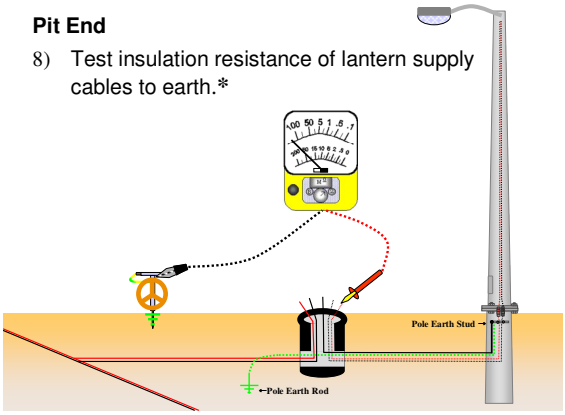
Lighting Column End

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



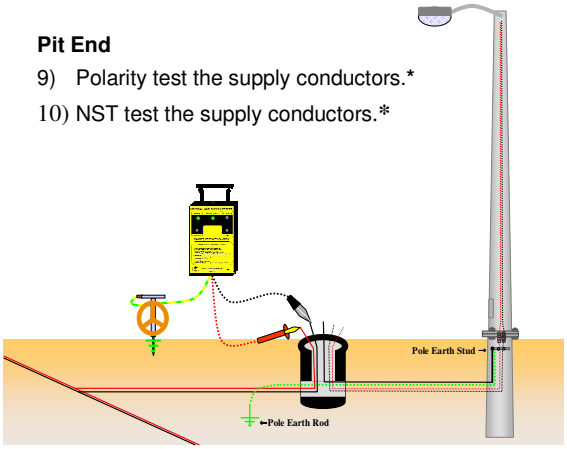
Pit End

8) Test insulation resistance of lantern supply cables to earth.*



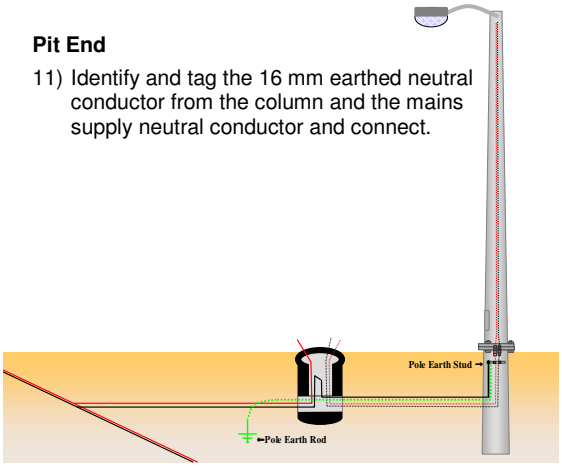
Pit End

9) Polarity test the supply conductors.*
10) NST test the supply conductors.*



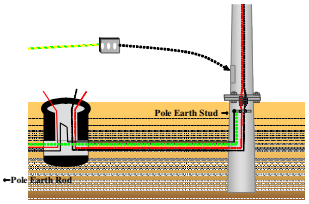
Pit End

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



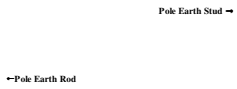
Lighting Column End

12) Test the pole for de-energised.*



Lighting Column End

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.

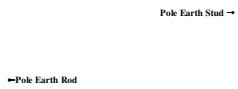
Lighting Column End

16) Test the column for de-energised.*

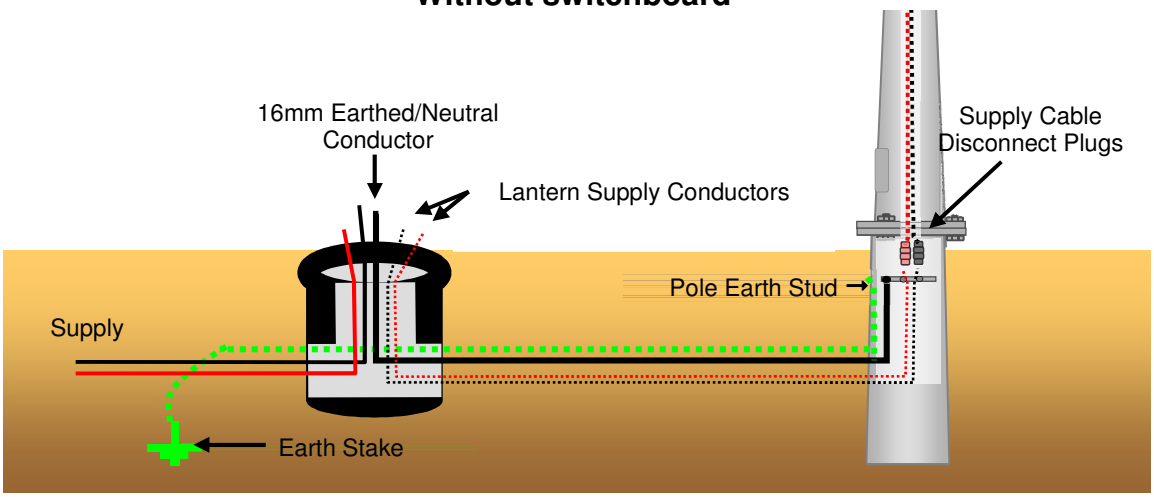
17) Check the lantern/s operation.

18) Check all connections and equipment.

19) Close and secure terminal covers.



Typical Wiring Arrangement
Slip Base Pole
Without switchboard



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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.
3. Identify existing active and neutral connections/conductors and mark/tag consumer's mains neutral where appropriate. (Refer Section 2.7)
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 – Consumers End

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

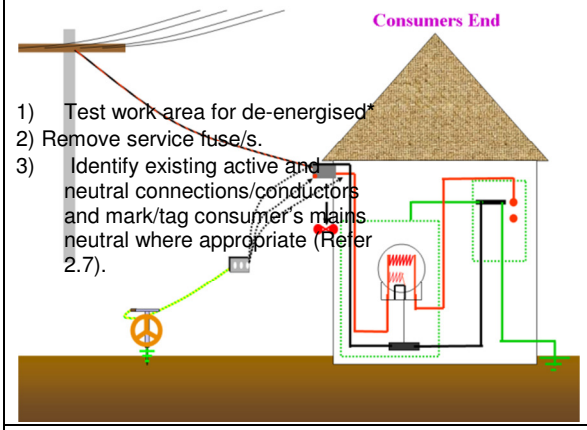
15. Raise service cable.
16. Visually identify service and supply neutral conductors, tag as appropriate and connect.
17. Identify and connect active service conductors to the appropriate active mains.

Servicing – Consumers End

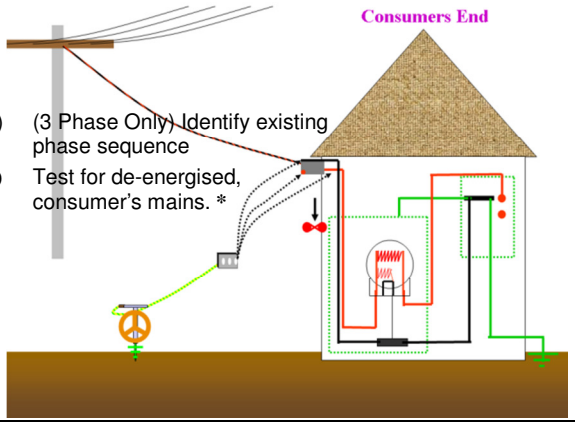
18. Polarity Test service cable conductors.*
19. NST Test service cable conductors.*
20. Connect Service Neutral to Consumers Mains Neutral.
21. Ensure phase sequence corresponds with phase sequence prior to disconnection. *
22. Check Test.*
23. Leave service fuse/s inserted.
24. NST to Neutral Integrity Test Point. *

* Refer to individual test procedures
++ Where NITP is not accessible, refer to alternative test arrangements in diagrams at step 10

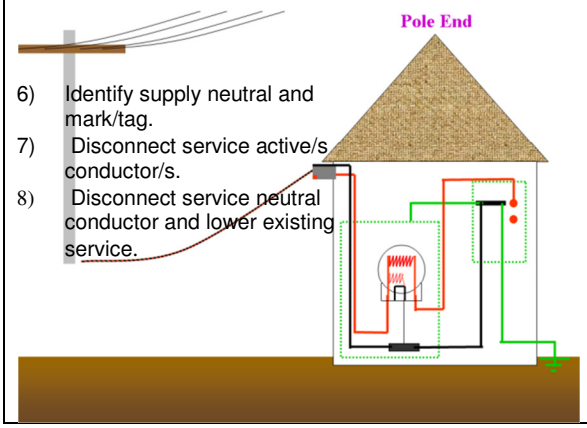
Replacement or Disconnection & Reconnection Overhead Service
Service cable "On Supply"



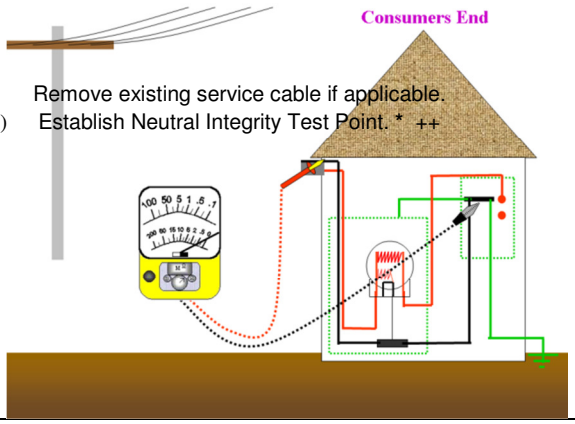
1) Test work area for de-energised*
2) Remove service fuse/s.
3) Identify existing active and neutral connections/conductors and mark/tag consumer's mains neutral where appropriate (Refer 2.7).



4) (3 Phase Only) Identify existing phase sequence
5) Test for de-energised, consumer's mains. *



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



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

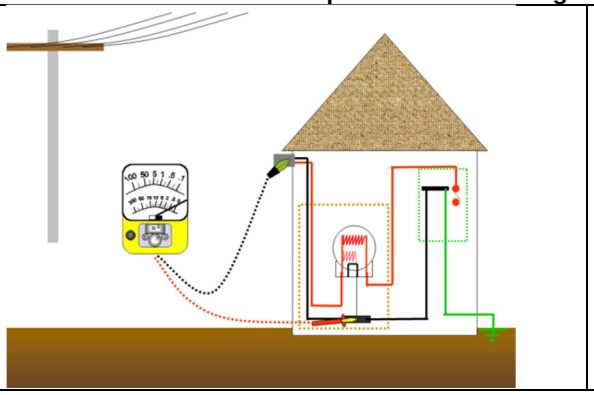
++ ALTERNATIVE TEST WHERE NITP NOT ACCESSIBLE

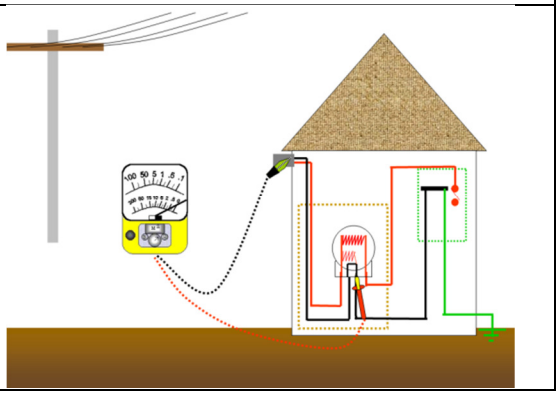
This variation is only permitted for service replacement procedures where the service protection device is at the load end.

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.

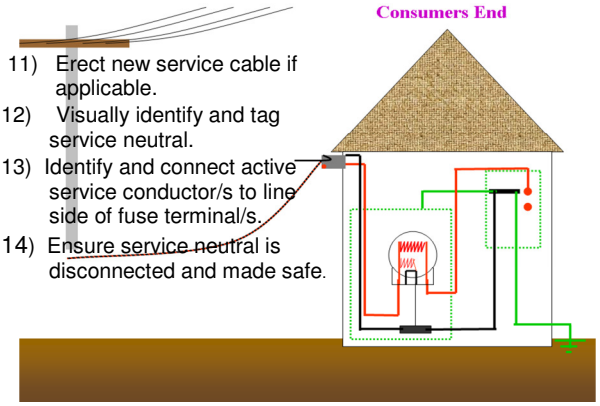
The maximum allowable test result is 0.5 ohm.

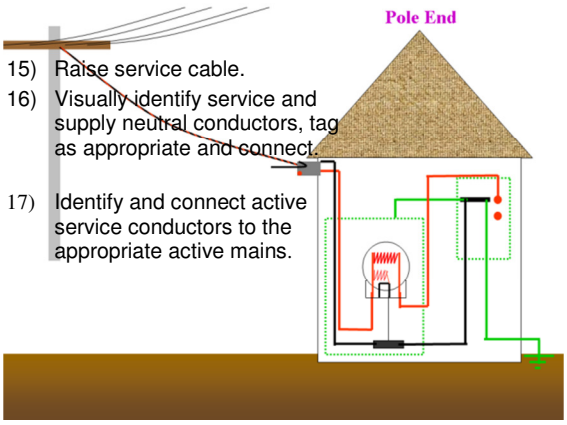
Neutral Link on Meter panel/board OR Outgoing Neutral on a ANNA connected Meter

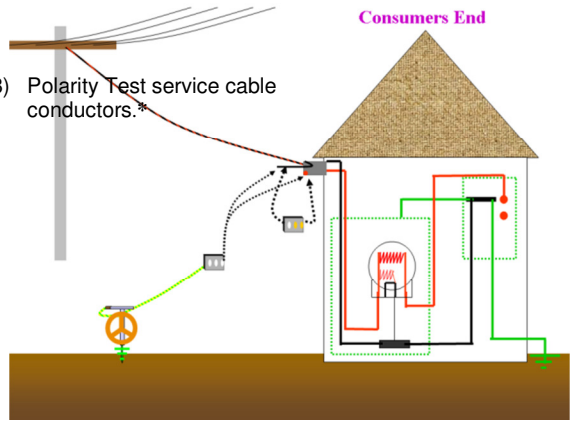


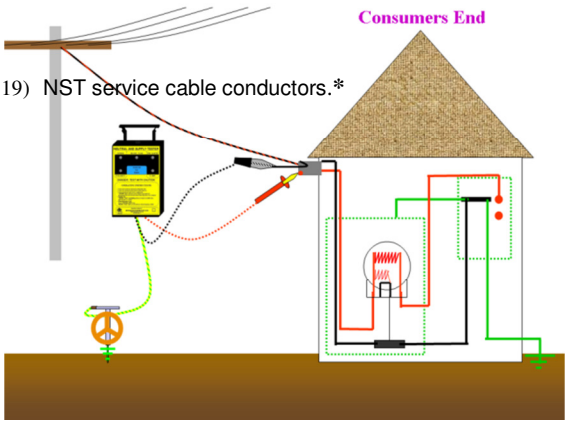


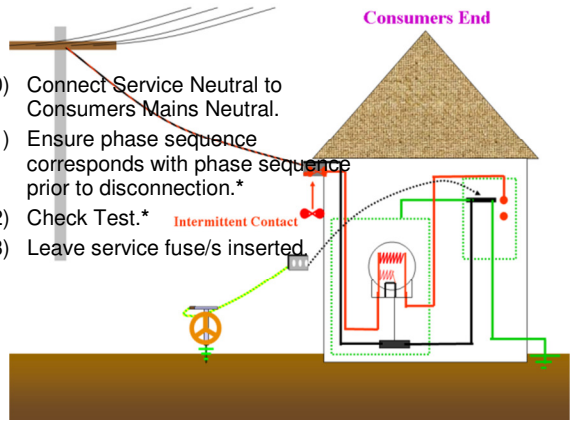
After establishing suitable continuity the outgoing neutral at the meter position may be used in substitution of the NITP for the purpose of this procedure.

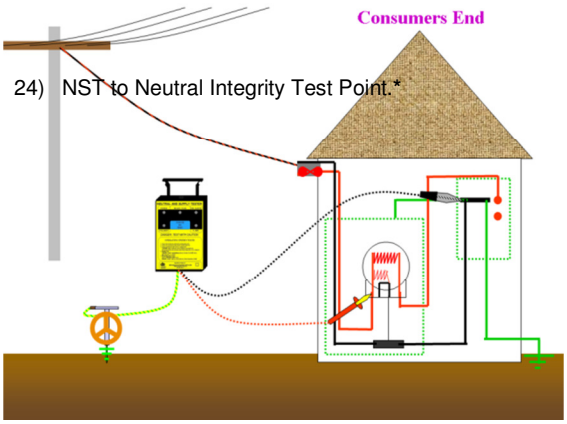












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4.11A Existing Installation:- Replacement or Disconnection & Reconnection Underground Consumer's Mains up to 100A, Single Occupancy Supplied from a Pit – Service cable "On or Off Supply"

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.

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 *

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. Conduct Underground Consumers Mains Test. * (Refer Note 2)

Reconnection: Section……. cont

Pit

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

Meter Position

19. Polarity Test consumer's mains conductors. *
20. NST consumer's mains conductors. *
21. Reconnect consumer's mains incoming neutral conductor.
22. Check Test/s. *
23. Leave service fuse/s inserted.
24. NST Test to Neutral Integrity Test Point. *
25. Phase Sequence Test (3 Phase only) * (Refer Note 1)
26. 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 Meg Ohms – 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 5 Meg Ohms. Where this value cannot be obtained, refer to individual Distributor Procedures.

4.11B 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 4.11A (Ii.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.

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 *

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.

Reconnection- Meter Position: Section……cont

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 Meg Ohms – 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 5 Meg Ohms. Where this value cannot be obtained, refer to individual Distributor Procedures.

4.11C Existing Installation:- Replacement or Disconnection and 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, 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.

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.

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 * ++

……. cont

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 5.3) should independent earth not be available for tests

…… cont

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/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 17 – The MEN link shall be removed by a licenced 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 Meg Ohms – 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 5 Meg Ohms. 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.

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4.12 Existing Installation:- Replacement Overhead Service cable- Service Cable "Disconnected"

NOTE: This procedure applies when replacing any service cable which was has been physically disconnected or broken at any point prior to the commencement of works, ie 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 2.7)
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)

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

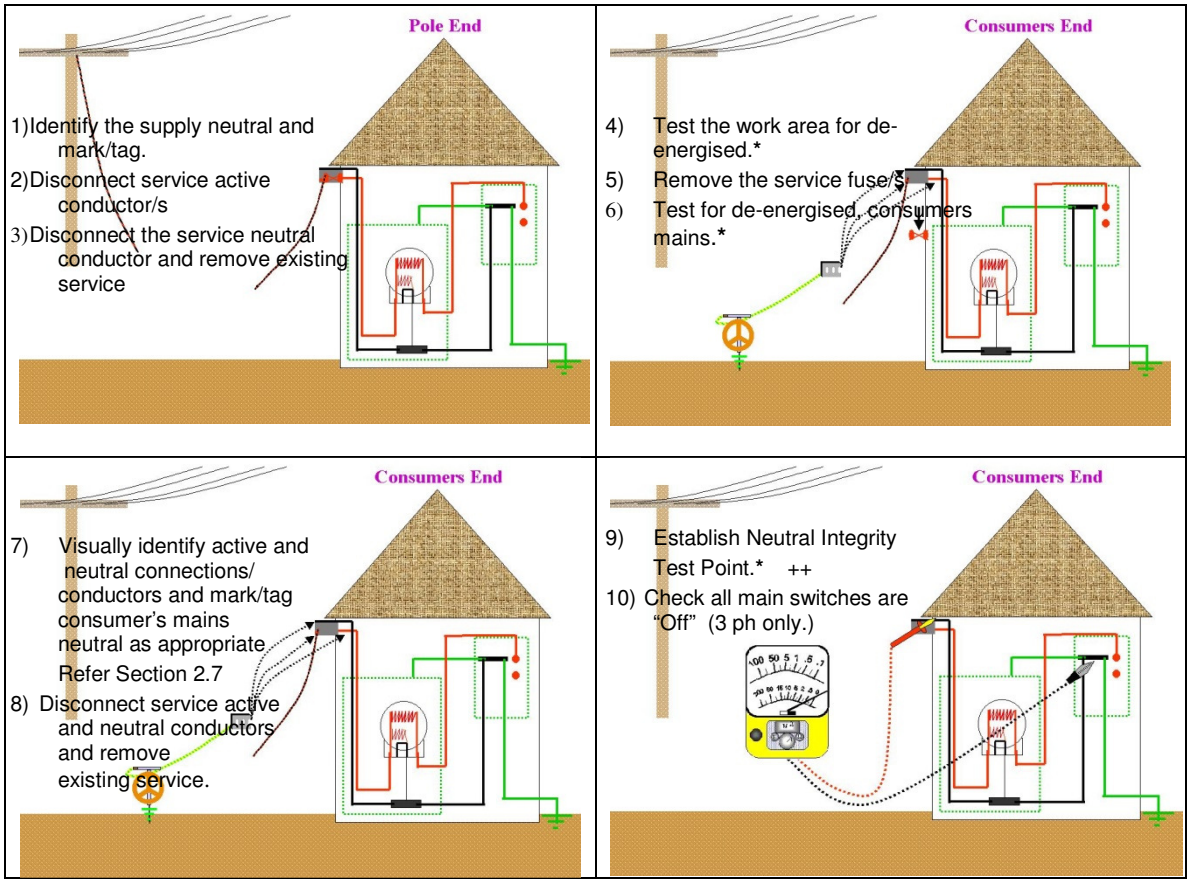
15. Erect service cable.
16. Visually identify service and supply neutral conductors, tag as appropriate and connect.
17. Identify and connect active service conductor/s to the appropriate active mains.

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

Replacement overhead service cable: – Service cable- "Disconnected"

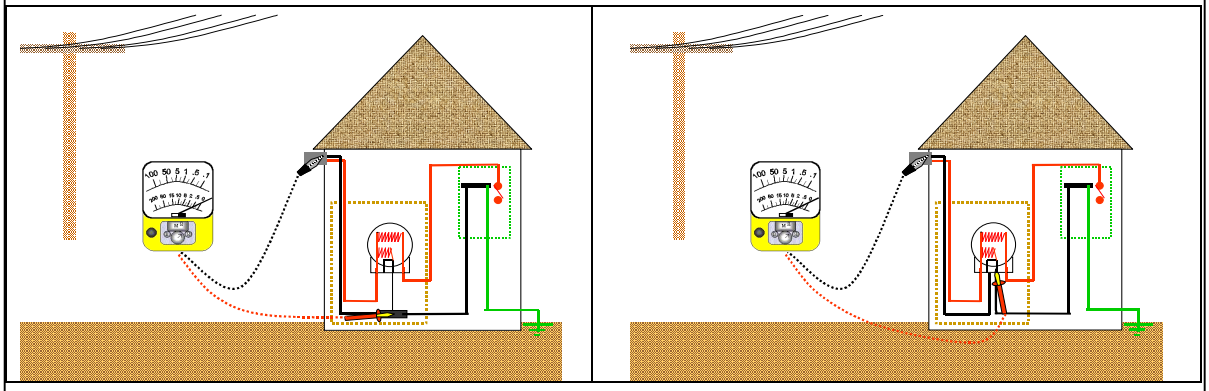


++ ALTERNATIVE TEST WHERE NITP NOT ACCESSIBLE

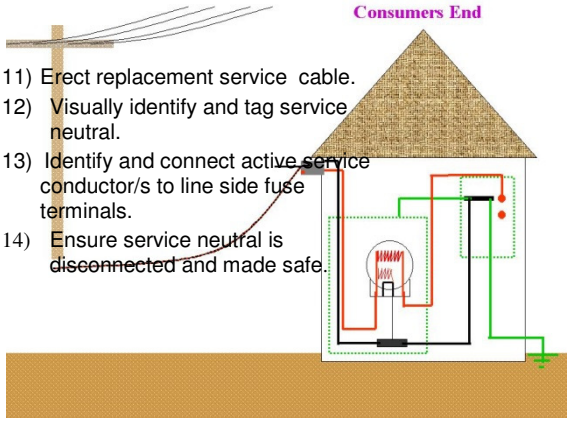
This variation is only permitted for service replacement procedures where the service protection device is at the load end.

Where the 3 normal NITPs are inaccessible in replacement overhead service procedures (service protection device- load end), the connector may substitute the NITP test with a test of continuity 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.

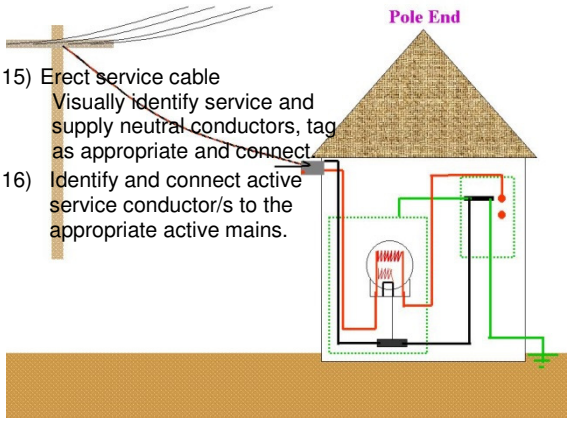
Neutral Link on Meter panel/board OR Outgoing Neutral on a ANNA connected Meter



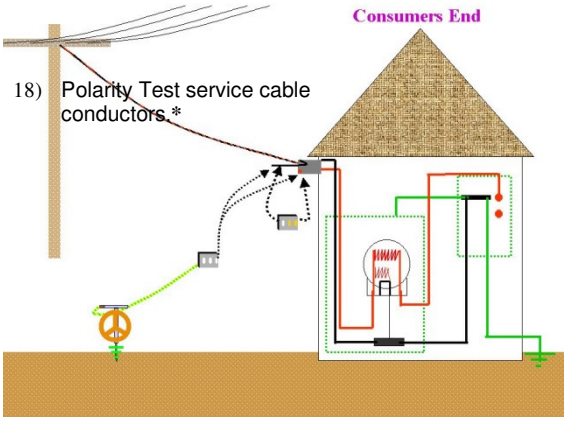
After establishing suitable continuity the outgoing neutral at the meter position may be used in substitution of the NITP for the purpose of this procedure.



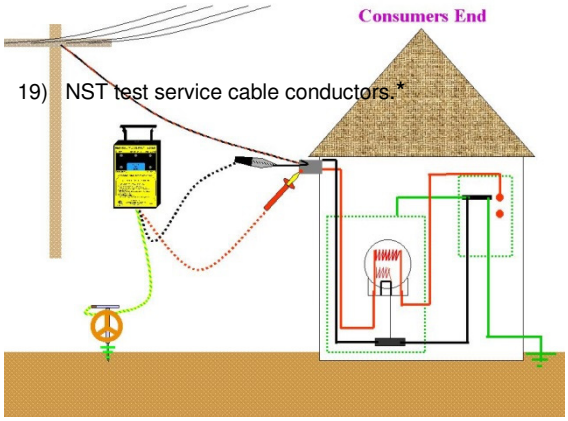
11) Erect replacement service cable.
12) Visually identify and tag service neutral.
13) Identify and connect active service conductor/s to line side fuse terminals.
14) Ensure service neutral is disconnected and made safe.



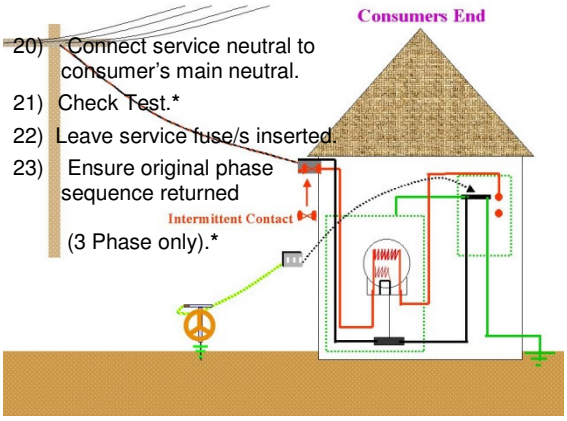
15) Erect service cable Visually identify service and supply neutral conductors, tag as appropriate and connect.
16) Identify and connect active service conductor/s to the appropriate active mains.



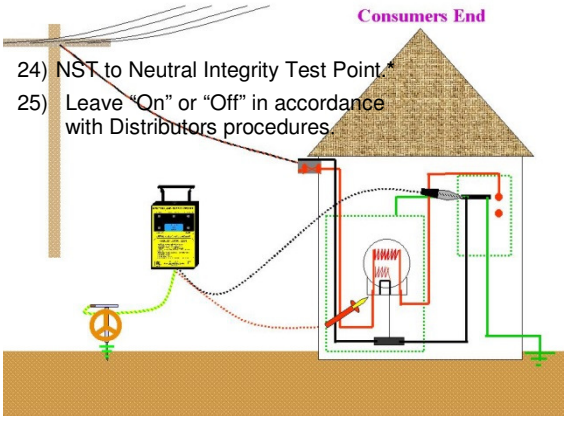
18) Polarity Test service cable conductors.*



19) NST test service cable conductors.*



20) Connect service neutral to consumer's main 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.

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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 Electrical Inspector 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 2.7)
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 2.7)

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.

Overhead Service Replacement SPD Pole End .....cont

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

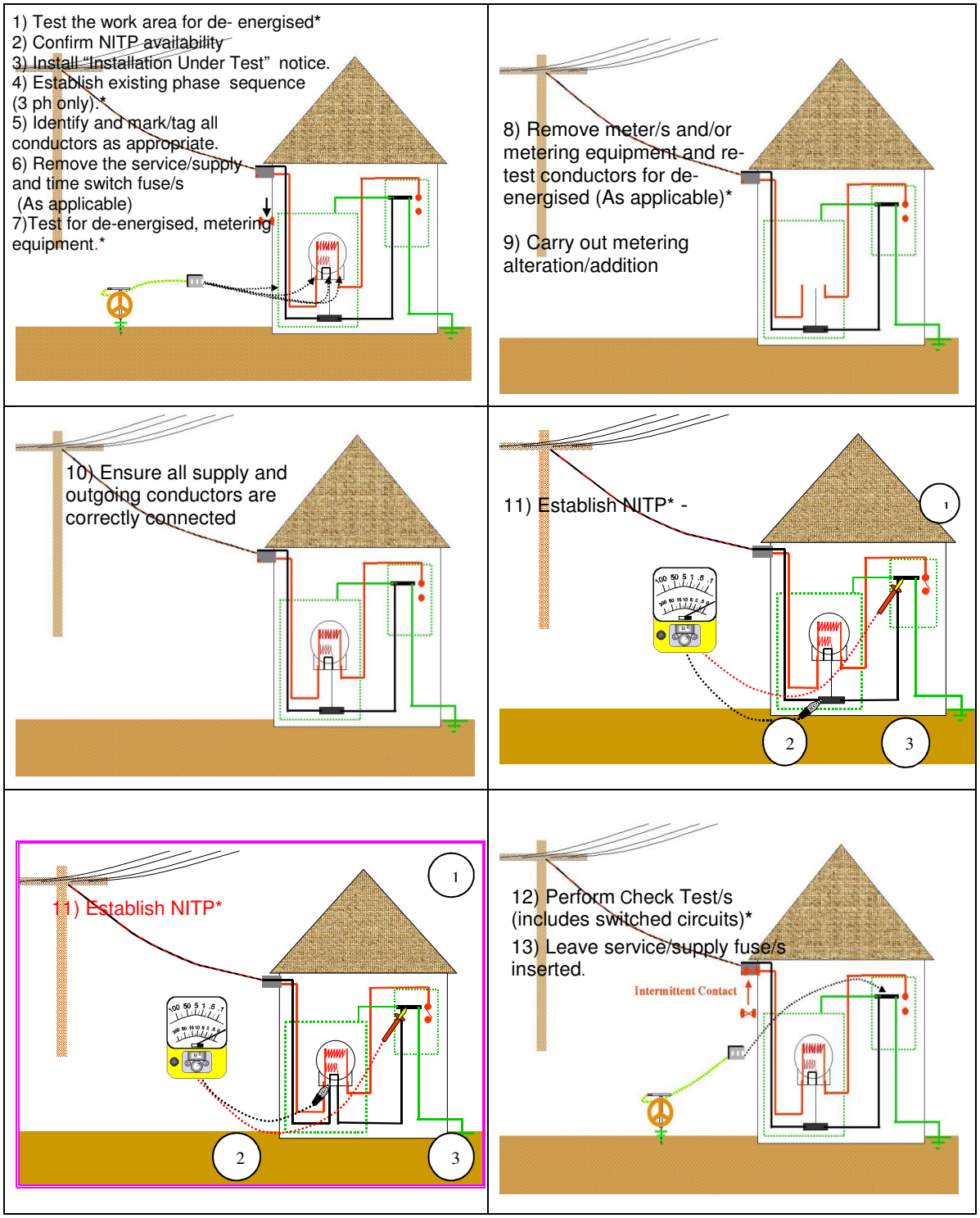
4.14 Existing Installation:- Single Occupancy Meter Alteration and/or Additions– Direct Metering

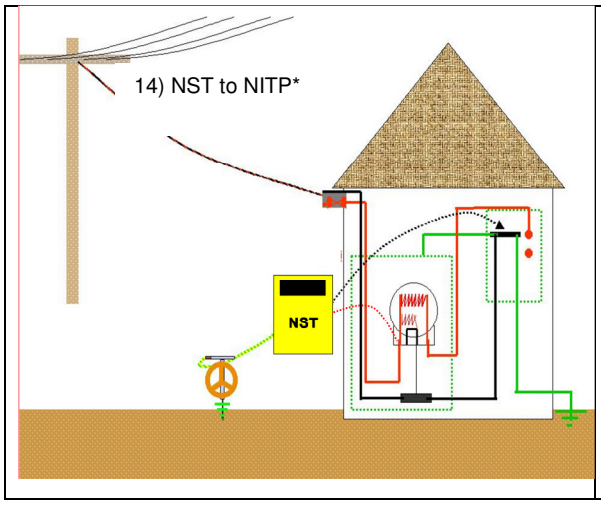
1. Test the work area for de-energised. *
2. Visually confirm NITP availability.
3. Install “Installation Under Test” notice/s.
4. Establish existing phase sequence (3 phase only) *
5. Identify and mark/tag all conductors as appropriate.
6. Remove the service/supply & time switch fuse/s (As applicable)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

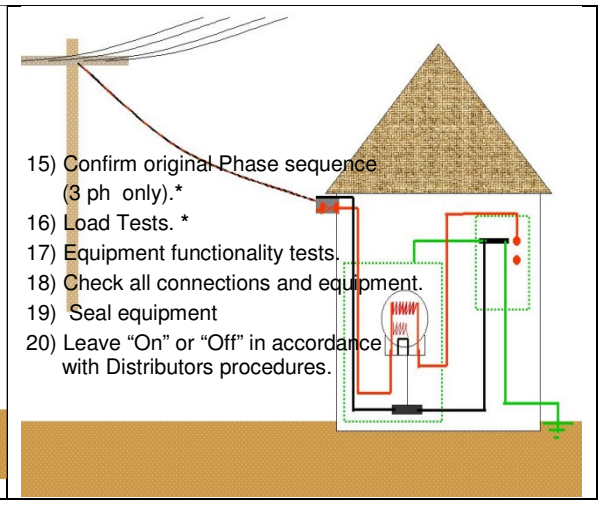
* Refer to individual testing procedures

Single Occupancy:- Meter Alteration and/or Additions – direct metering

Typical Arrangement




14) NST to NITP*
NST


15) Confirm original Phase sequence
(3 ph only).*
16) Load Tests. *
17) Equipment functionality tests.
18) Check all connections and equipment.
19) Seal equipment
20) Leave “On” or “Off” in accordance
with Distributors procedures.

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4.14A Existing Installation:- Multiple Occupancy (MO) Alteration and/or Additions- Direct Metering

Main or Occupancy Neutral Not Disturbed *(see definitions)*

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.

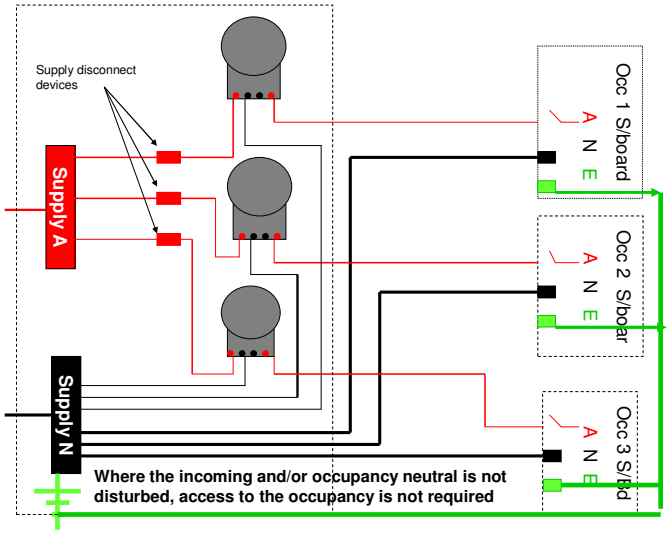
1. Test the work area for de-energised. * ++
2. Install "Installation Under Test" notice/s.
3. Confirm single metering neutral conductor
4. Visually confirm MEN connection point or neutral bar/link at remote meter board as the NITP.*
5. Establish existing phase sequence (3 phase only). *
6. Identify 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 5.3) should independent earth not be available for tests

Existing Installation: Multiple Occupancy – Meter Alteration and/or Additions Direct Metering Main or Occupancy Neutral Not Disturbed

Typical Arrangements

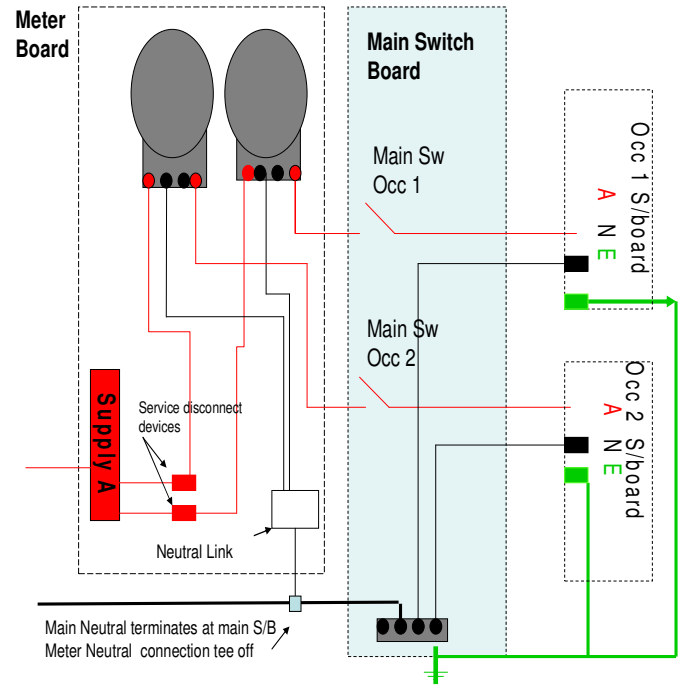


Meter and occupancy neutrals terminated in links at meter position.

- 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

4.14B 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 S/board

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.

Mutilple Occupancy- Alteration and Additions: Section ……..cont

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.

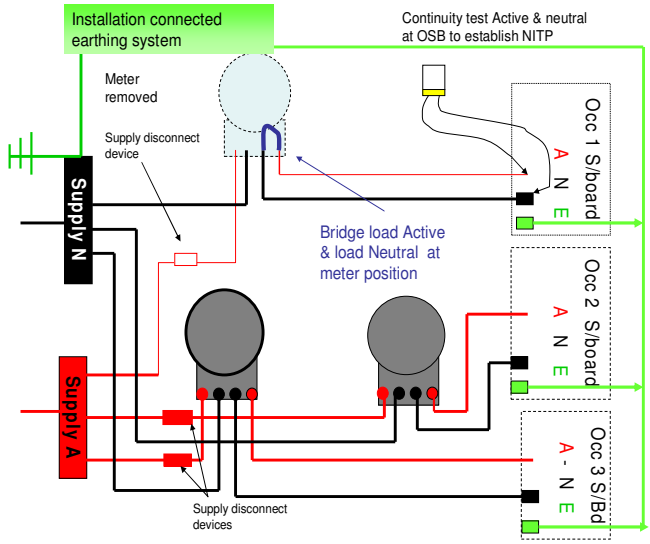
* Refer to individual test procedures and the following diagrams

++ Refer to appendix (section 5.3) 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 5.3 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.

Existing installation:- Multiple Occupancy Alteration and/or Additions Direct Metering Main or Occupancy Neutral Disturbed

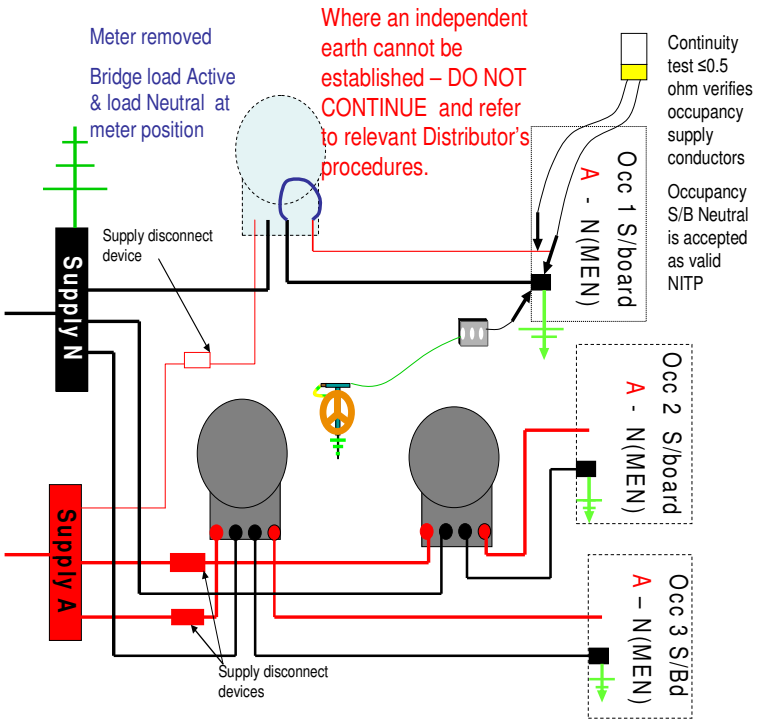
Typical Arrangements



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.

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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 work area for de-energised.*
2. Install “Installation Under Test” notice.
3. Identify current, voltage and any switching active and neutral conductors and mark as appropriate.
4. Establish existing phase sequence.*
5. Isolate the voltage/potential circuits from the meter by removing the fuses ++
6. Test for de-energised*
7. Insert ‘shorting’ plugs into the current circuit of the meter test block. (All Phases)
8. Open the current links of the meter test block (All Phases)
9. Conduct Metering Replacement/Alterations.
10. Check all connections.
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.
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 meter by inserting fuses. ++
16. Conduct specialist-metering checks/tests in accordance with individual Distributor and meter provider requirements.
17. Confirm original phase sequence.*
18. Equipment functionality checks.
19. Seal metering and associated equipment.

* Refer to individual test procedures.

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

Alteration and /or Additions- CT metering

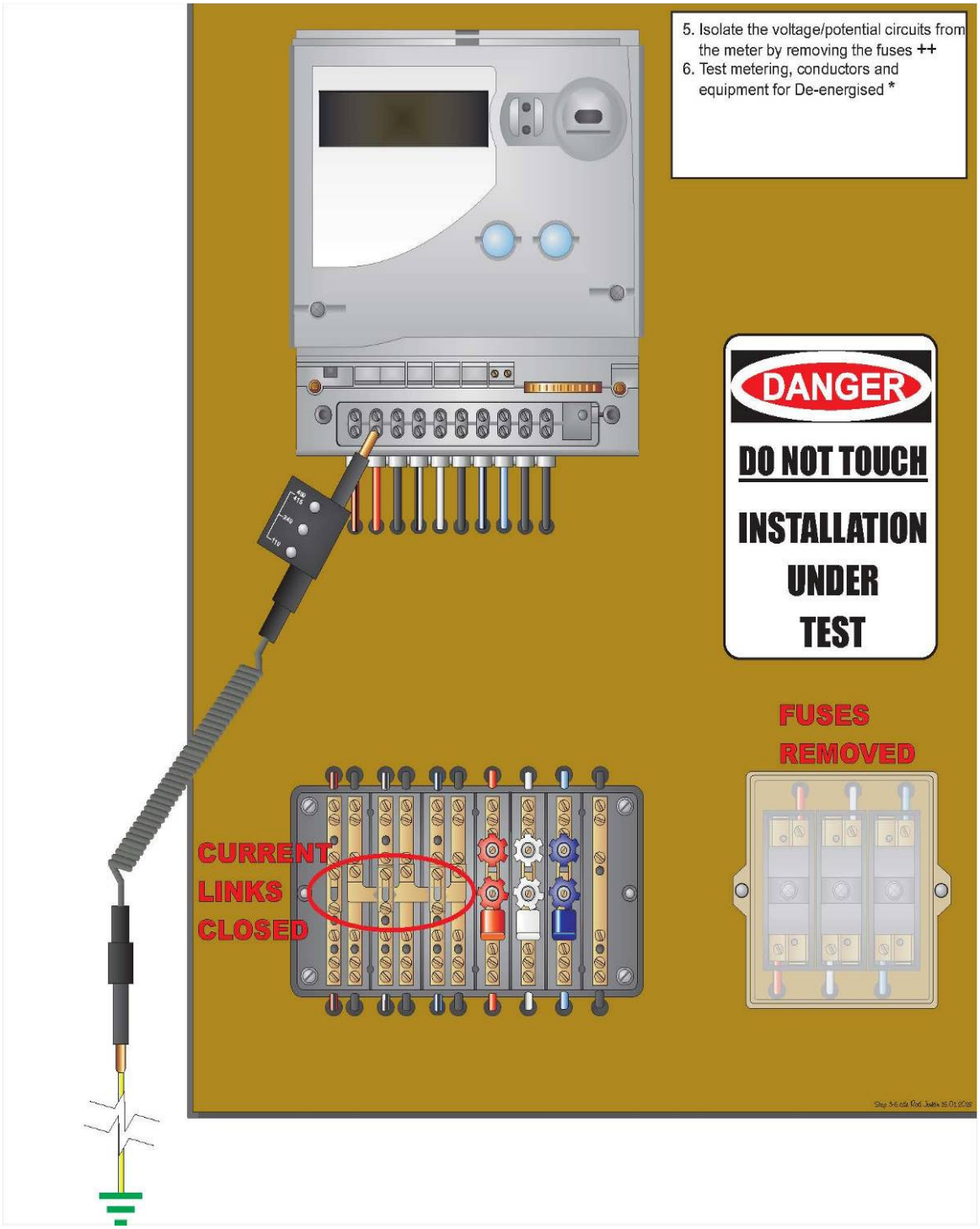
Typical arrangement

Alteration and /or Additions - CT metering

Typical arrangement

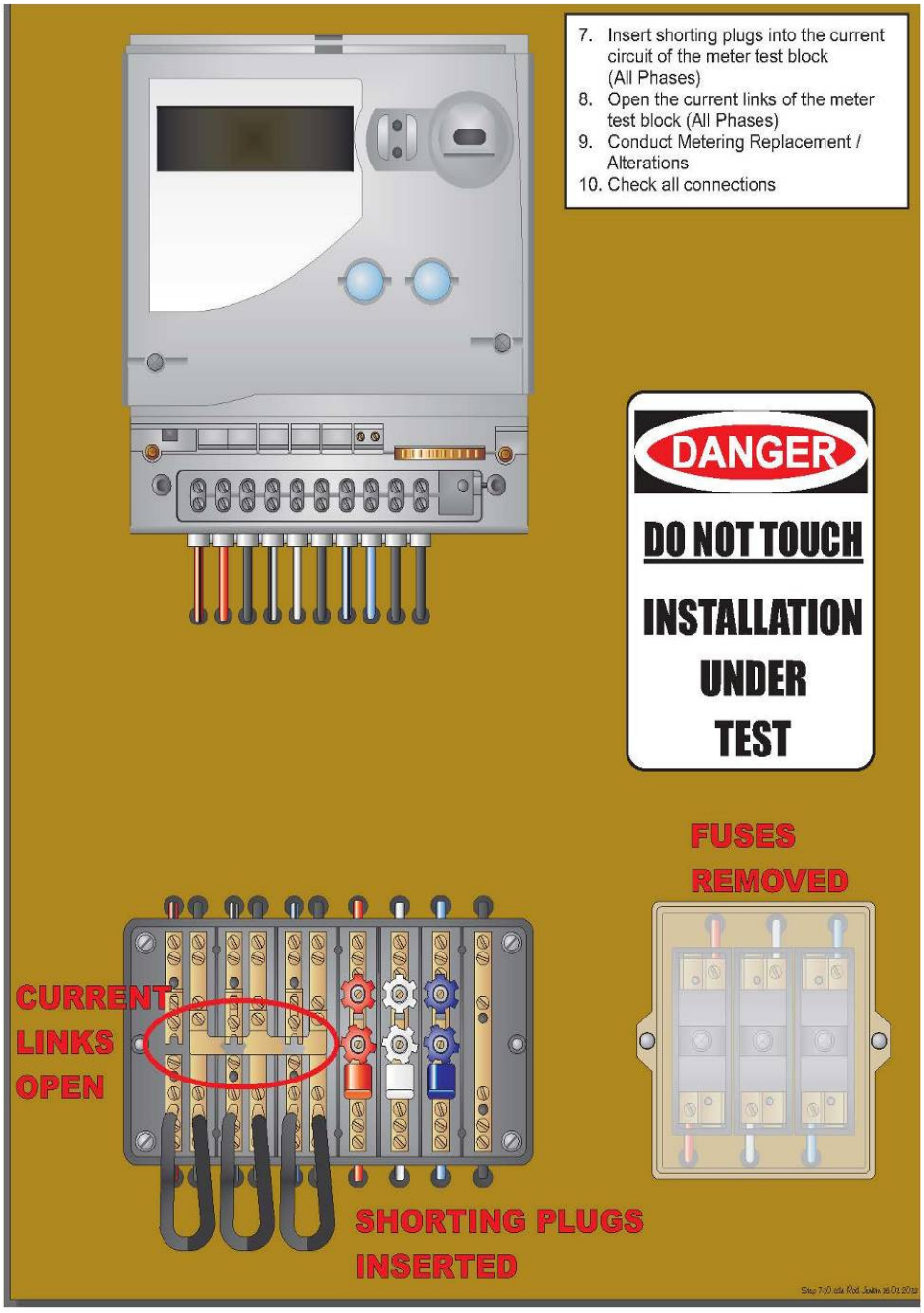
Alteration and /or Additions - CT metering

Typical arrangement



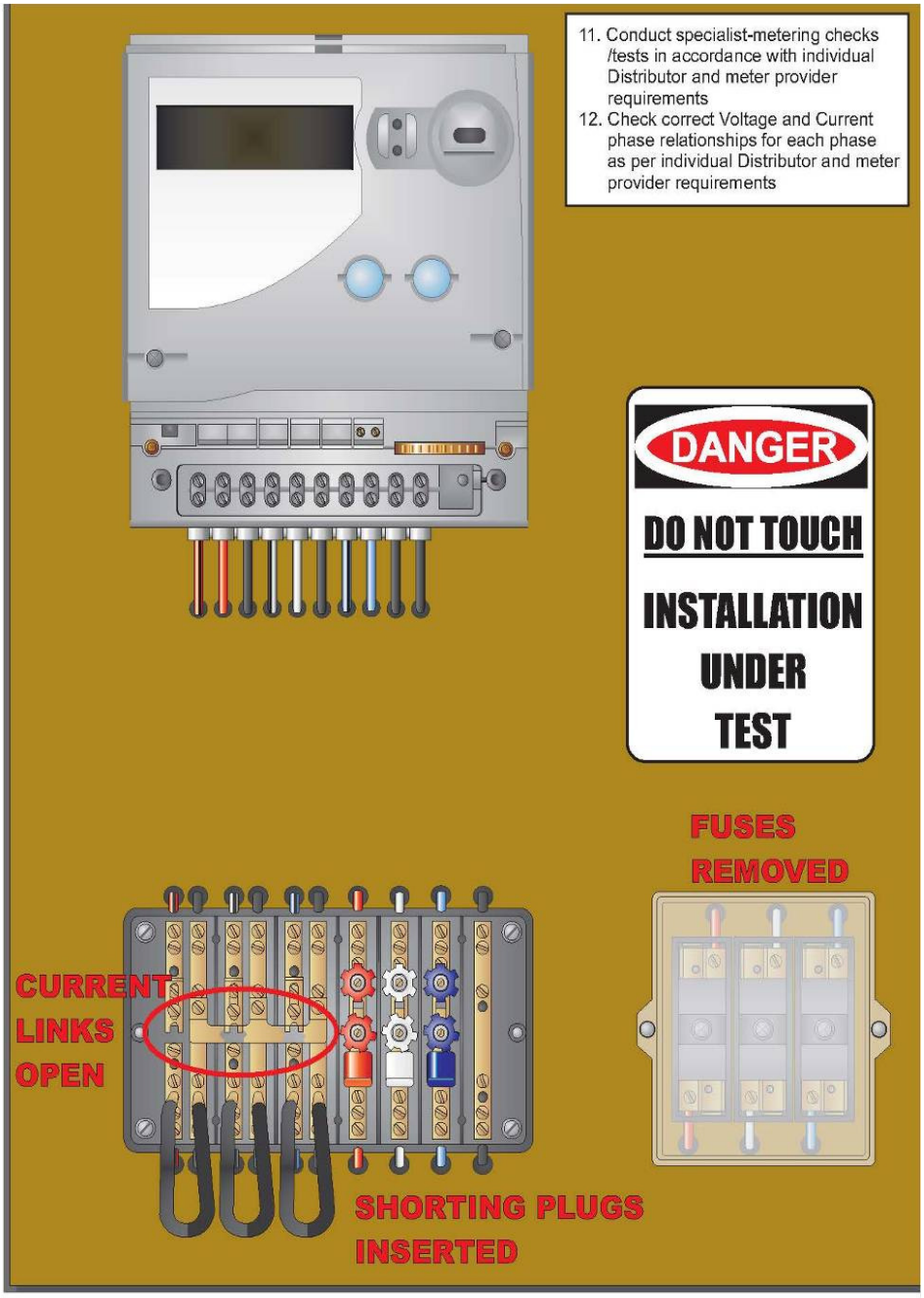
Alteration and /or Additions - CT metering

Typical arrangement



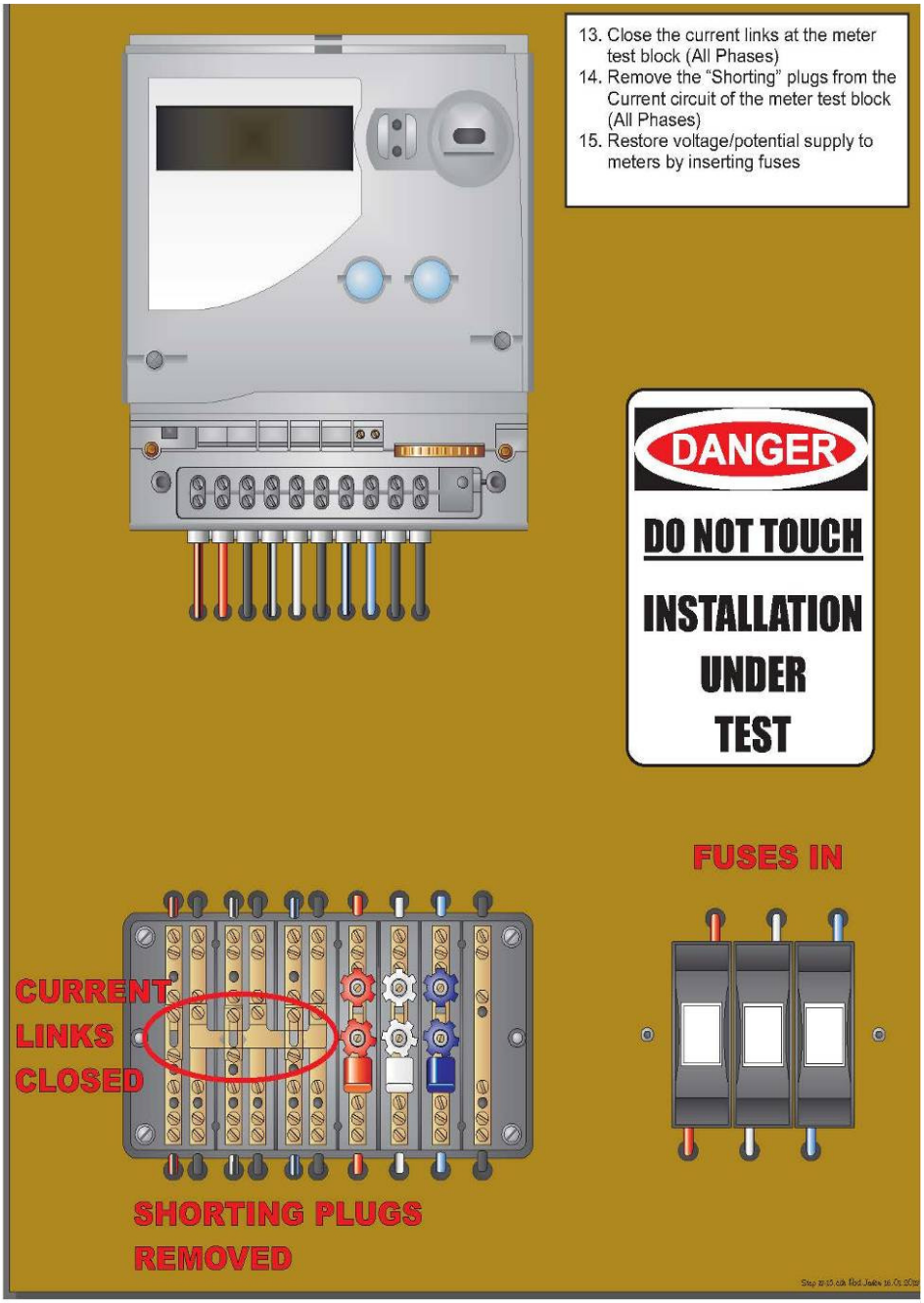
Alteration and /or Additions - CT metering

Typical arrangement



Alteration and /or Additions - CT metering

Typical arrangement

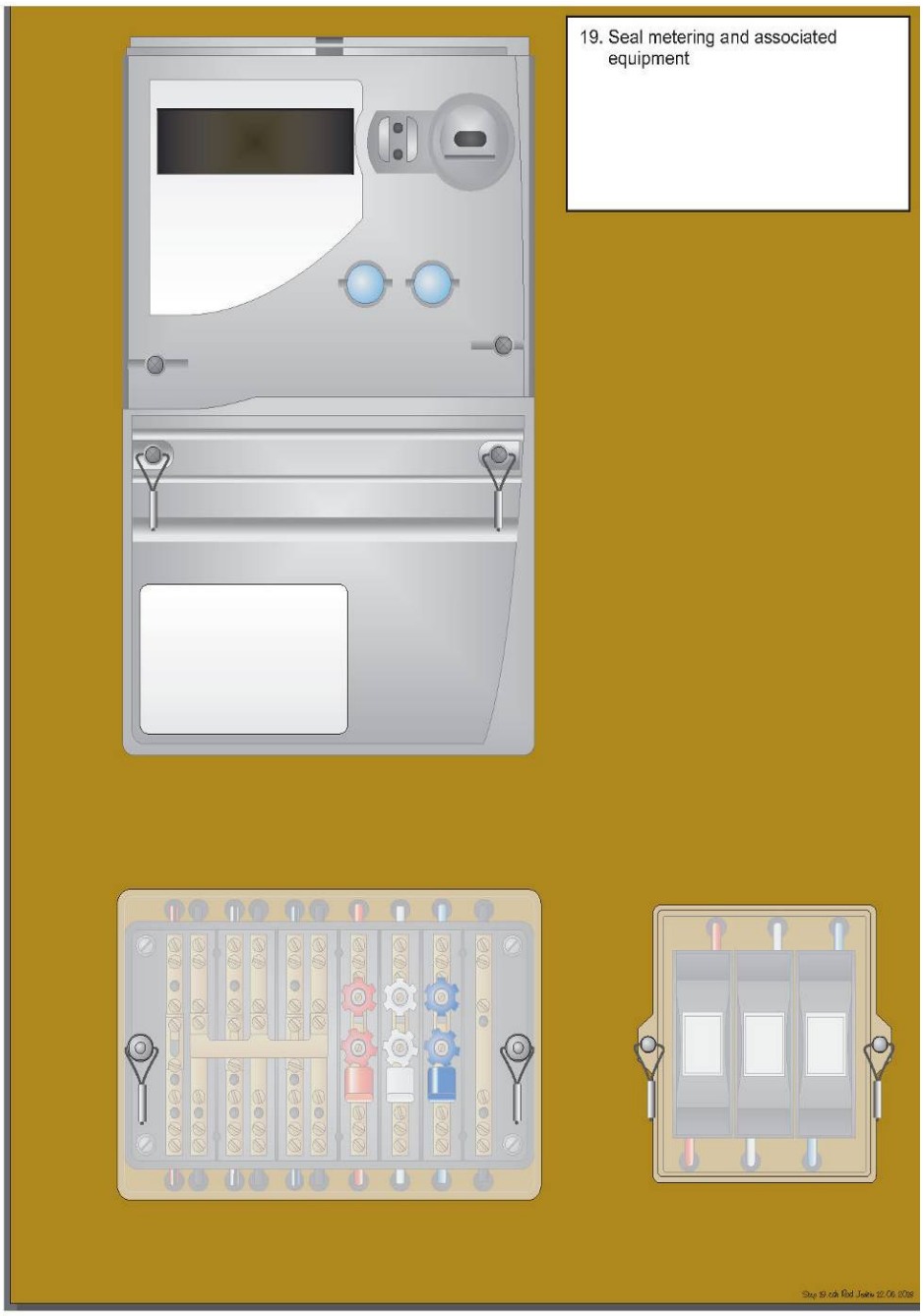


Alteration and /or Additions - CT metering

Typical arrangement

Alteration and /or Additions - CT metering

Typical arrangement



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4.16 Other Installations:- 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.

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.

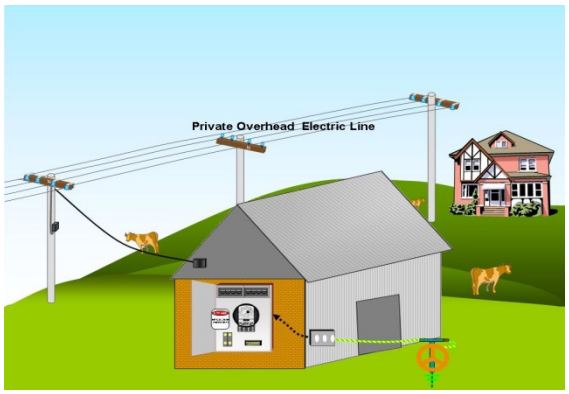
NOTES:
-Should further work be required by customer/REC – Defect notice may need to be issued

* Refer to individual test procedures

Typical Abolishment - Overhead Supply

Installation/Occupancy

1. Test for de-energised.
2. Identify correct site location.
3. Confirm abolishment requirement if possible.
4. Identify if installation wiring work required by customer/REC to complete abolishment (eg disconnect POEL conductors/wiring).
5. Install Installation Under Test notice.
6. Switch off main switches.
7. Remove SPD/SDD as appropriate.

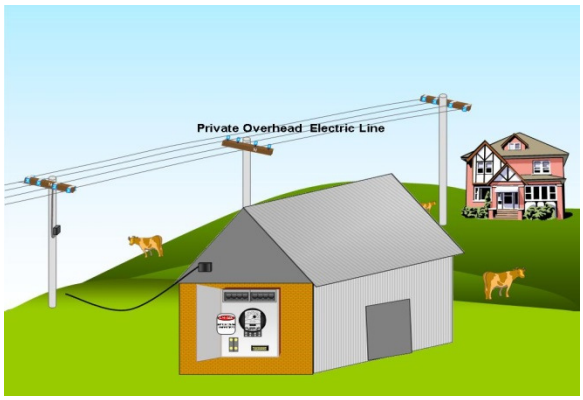


Supply End

8. Identify service cable conductors or consumer's mains conductors to be disconnected.
9. Disconnect service conductors from supply point.
10. Ensure supply points are left in a safe condition.

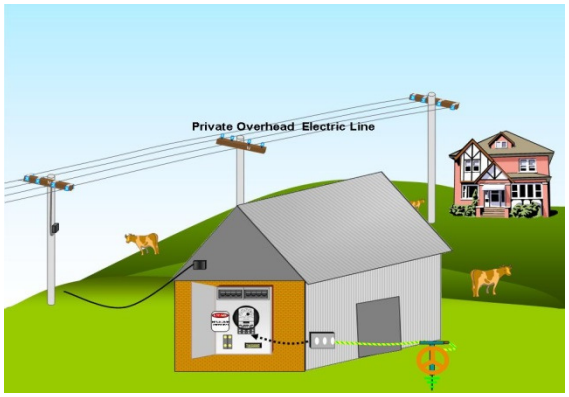
As applicable:

- -Check that only the conductors intended to be disconnected are disconnected.
- -Remove the overhead service cable.



Installation/Occupancy

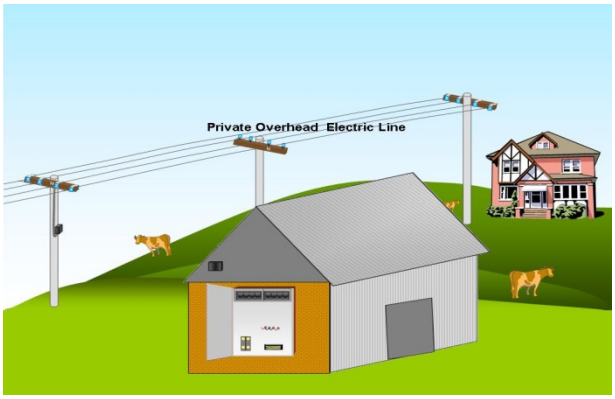
11. Test for de-energised.



Installation/Occupancy

12. Remove metering and Distributor's supply assets and re-test conductors for de-energised.
13. Ensure meter panel wiring and supply conductors to be left in a safe condition.

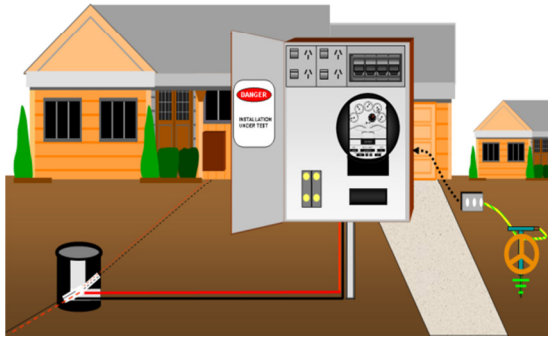
NOTE~ Should further work be required by customer/REC – Defect notice may need to be issued.



Typical Abolishment - Underground Supply

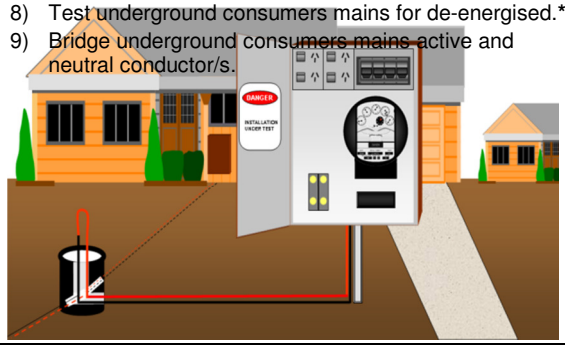
Preliminary Site Checks

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.



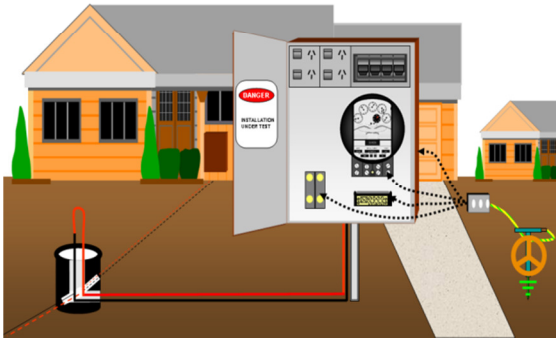
Supply/Pit End

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.



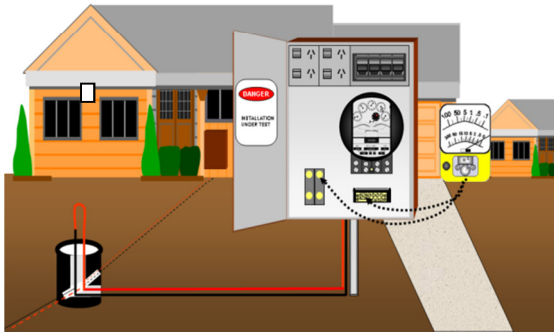
Installation End

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



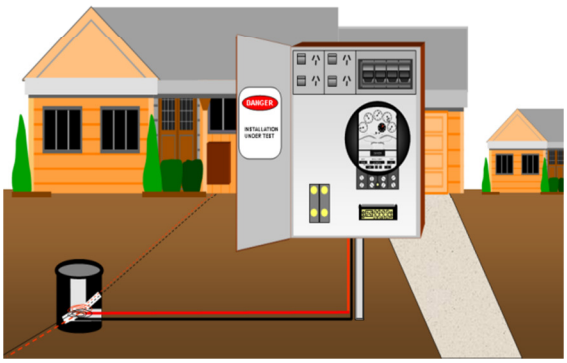
Installation End

11) Conduct continuity test between active/s and neutral on underground consumer mains. (Less than 0.5Ω required).



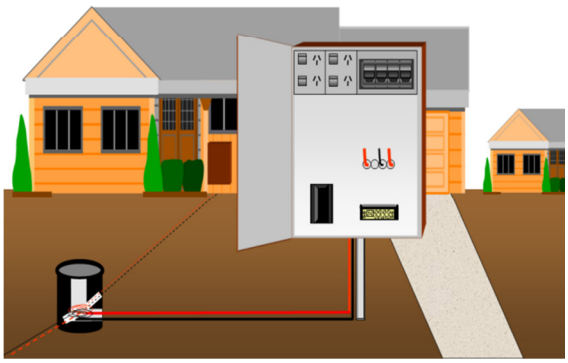
Supply/Pit End

12) Seal/insulate all unterminated cables ends.



Installation End

13) Remove metering equipment.
14) Remove fuse/s from carrier/s and refit carriers.



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4.17 Other Installations:- 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.

1. 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

An investigation of installations suspected to be affected. The investigation shall be performed by a person with an "Electrician's" or an "Inspector's" qualification and is 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.

2. 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.

3. HVI Confirmed – Isolation Process

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

i) Isolate all installations connected to the LV conductor or conductors as identified by the investigation.

ii) Where practicable, advise customer/s of isolation and supply restoration process; and

iii) Isolate installations to be inspected from the distribution system prior to re-energisation of the distribution conductors; and

iv) Ensure precautions are taken to prevent re-energisation of each isolated installation prior to its inspection.

4. Installation inspection

Unless otherwise determined by the relevant Distributors responsible officer:

a) The inspection:

i) Shall be made by a person with an “Electrician’s” or an “Inspectors” qualification who is 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.

The Inspection……. cont

b) Inspection procedure:

i) 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.

ii) 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.

iii) 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.

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

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

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4.18 Other Installations:- 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

1. Turn off the customers main switch where possible
2. Remove service/supply fuse/s
3. Test for de-energised. *
4. Identify consumers incoming mains neutral and ensure it is disconnected and made safe.
5. 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.

At the meter position of the remaining installations upstream of the cable fault……..cont

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 consumers 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 consumers 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 4.10 and substitute applicable steps into the above procedure as required.

Section 5.

Appendices.

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

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5.1 Contents

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5.2A 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

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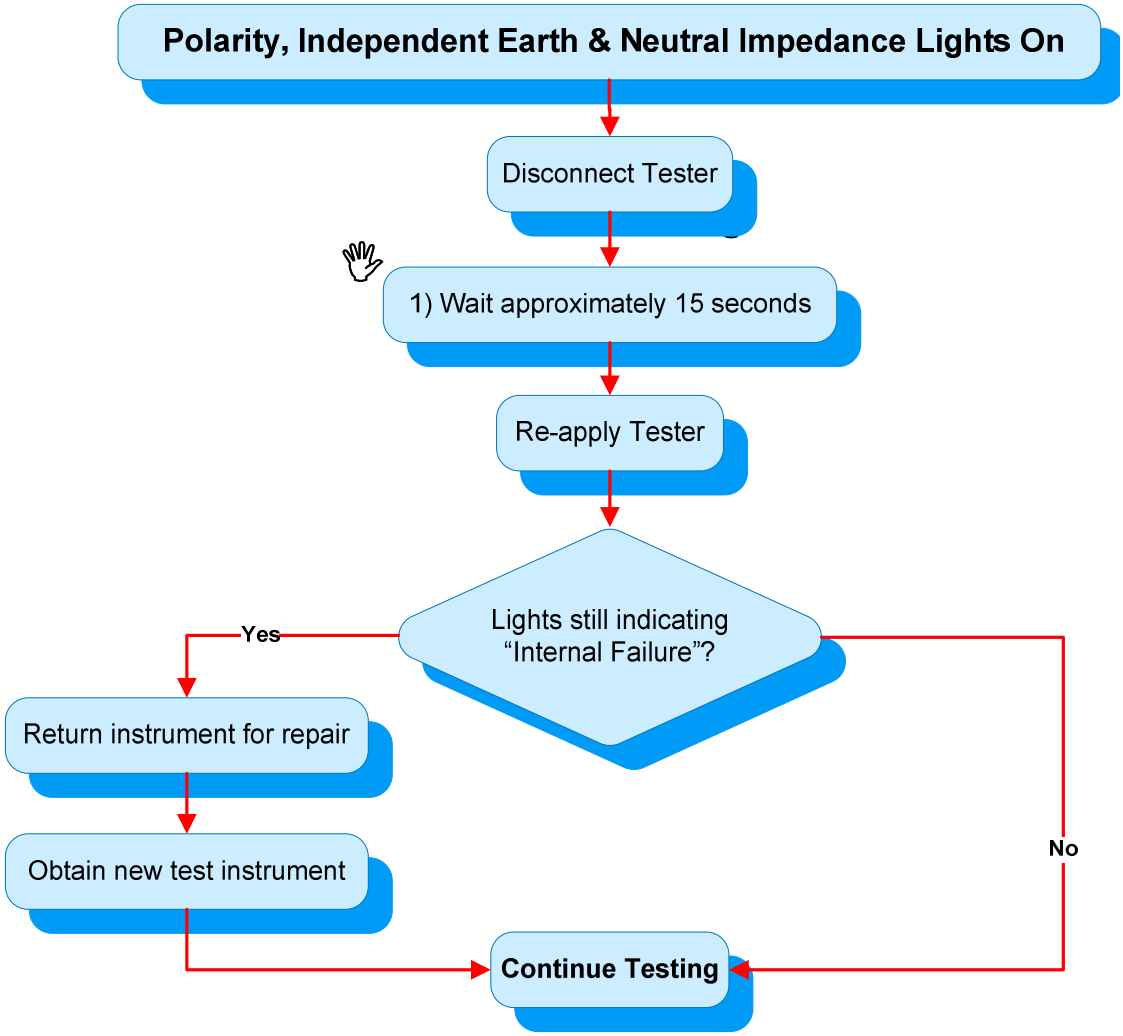
Power Light On – Ready Pass Light Flashing Dim and Quickly

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

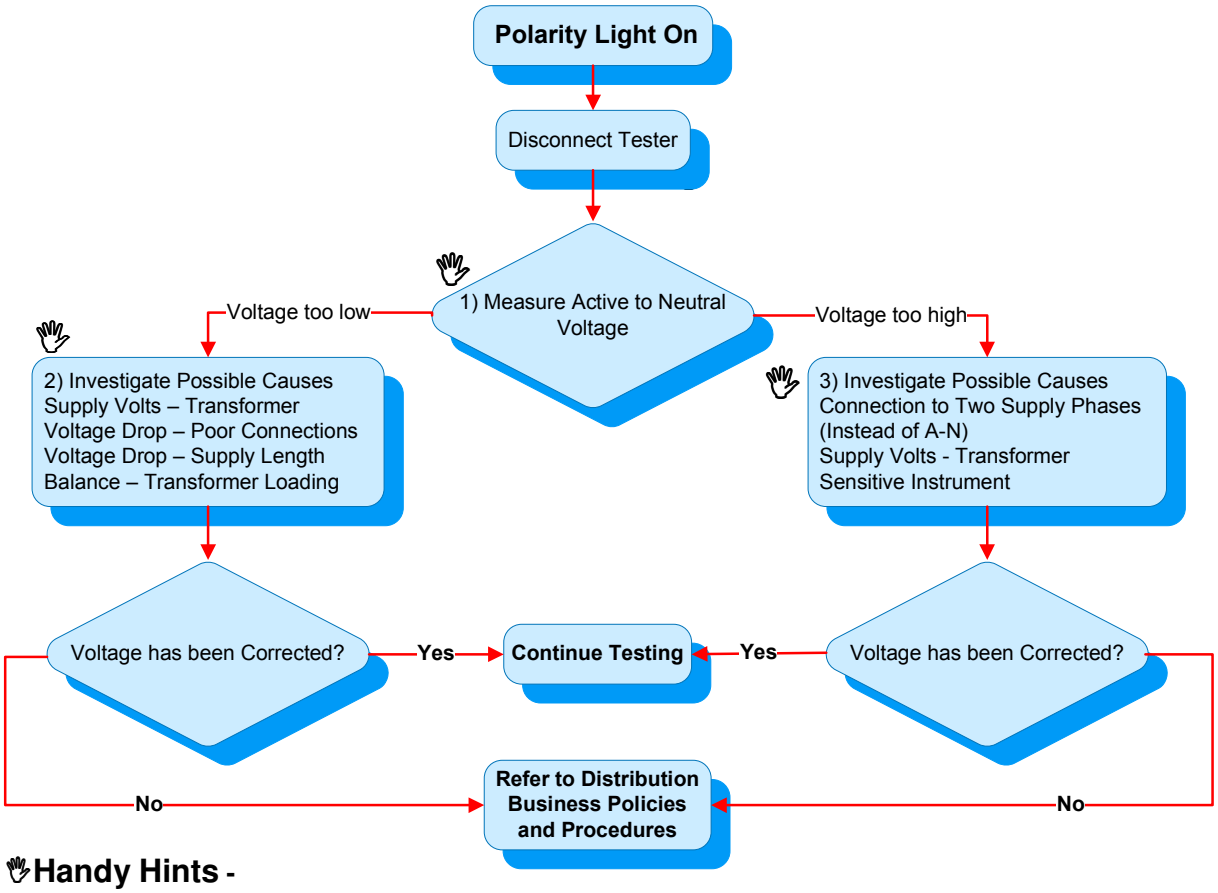
Note: Dependant upon other circuit factors this light may not activate in all circumstances, although the fault will be indicated through the activation of the polarity light (active to neutral supply voltage outside the acceptable test range), or other fault indication.



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.

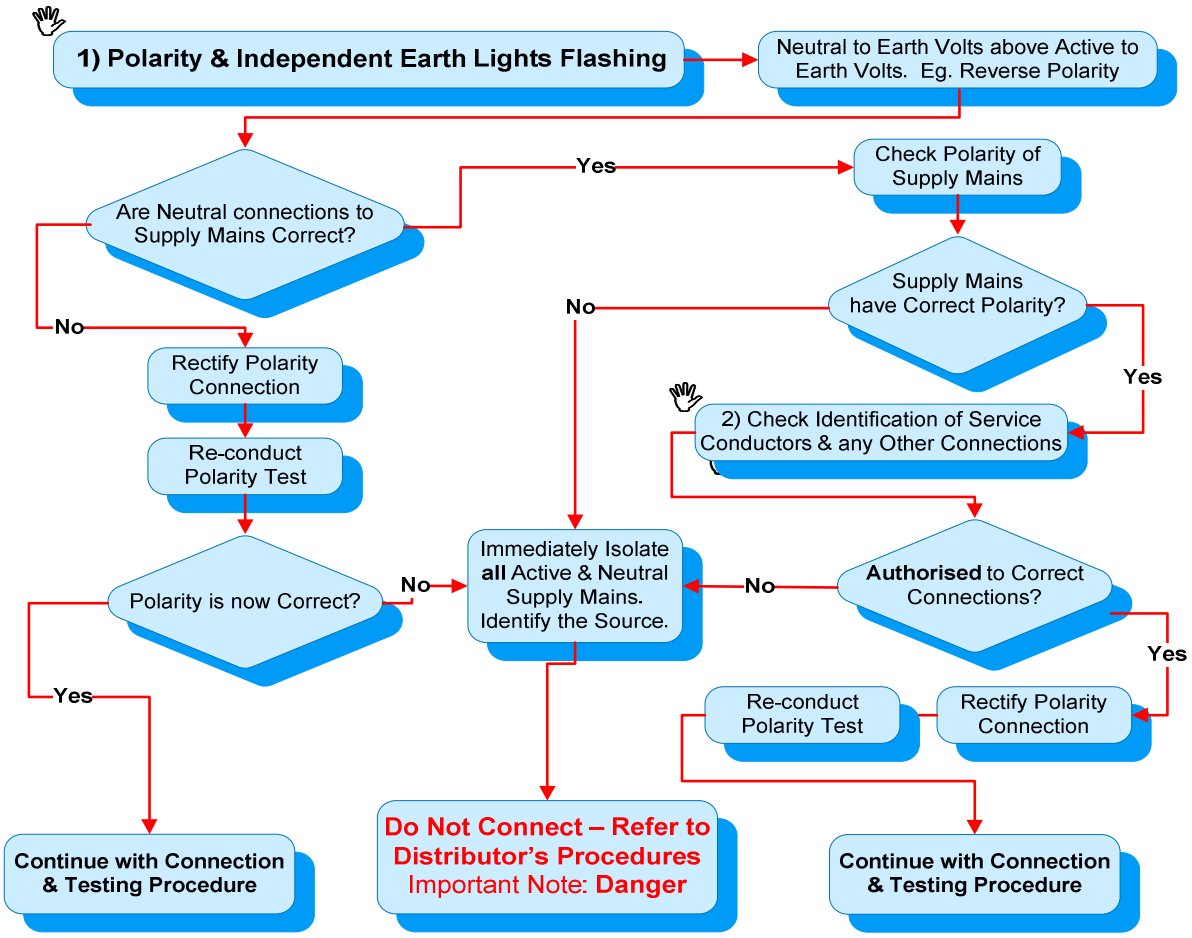
   Where poor connections are suspected, testing across the connection with a voltmeter is a valuable method of identifying abnormalities.

   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 –

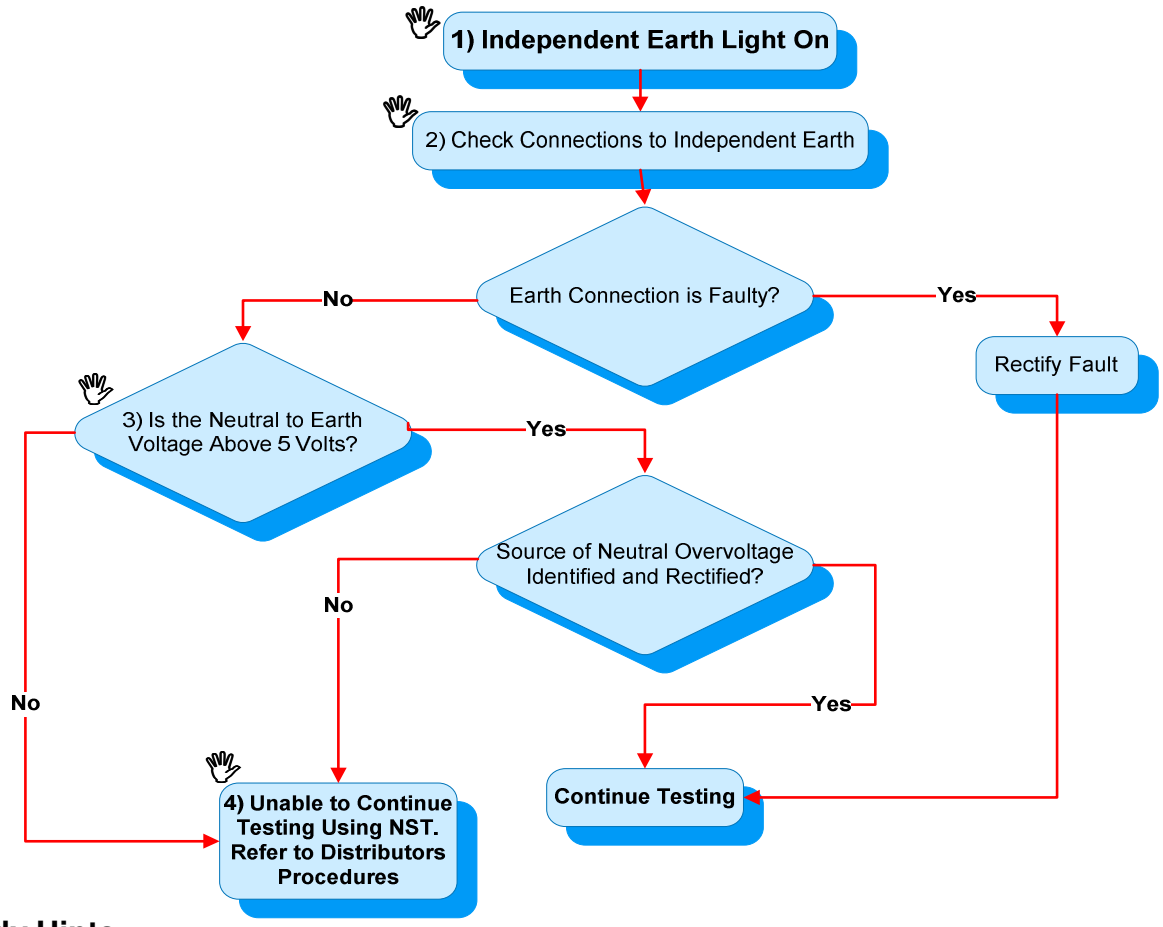
1) The **Power Light** activating immediately upon the neutral test lead being connected to the neutral under test, indicates the neutral under test is alive. **Danger -** The active test lead will immediately be alive in these circumstances.

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.



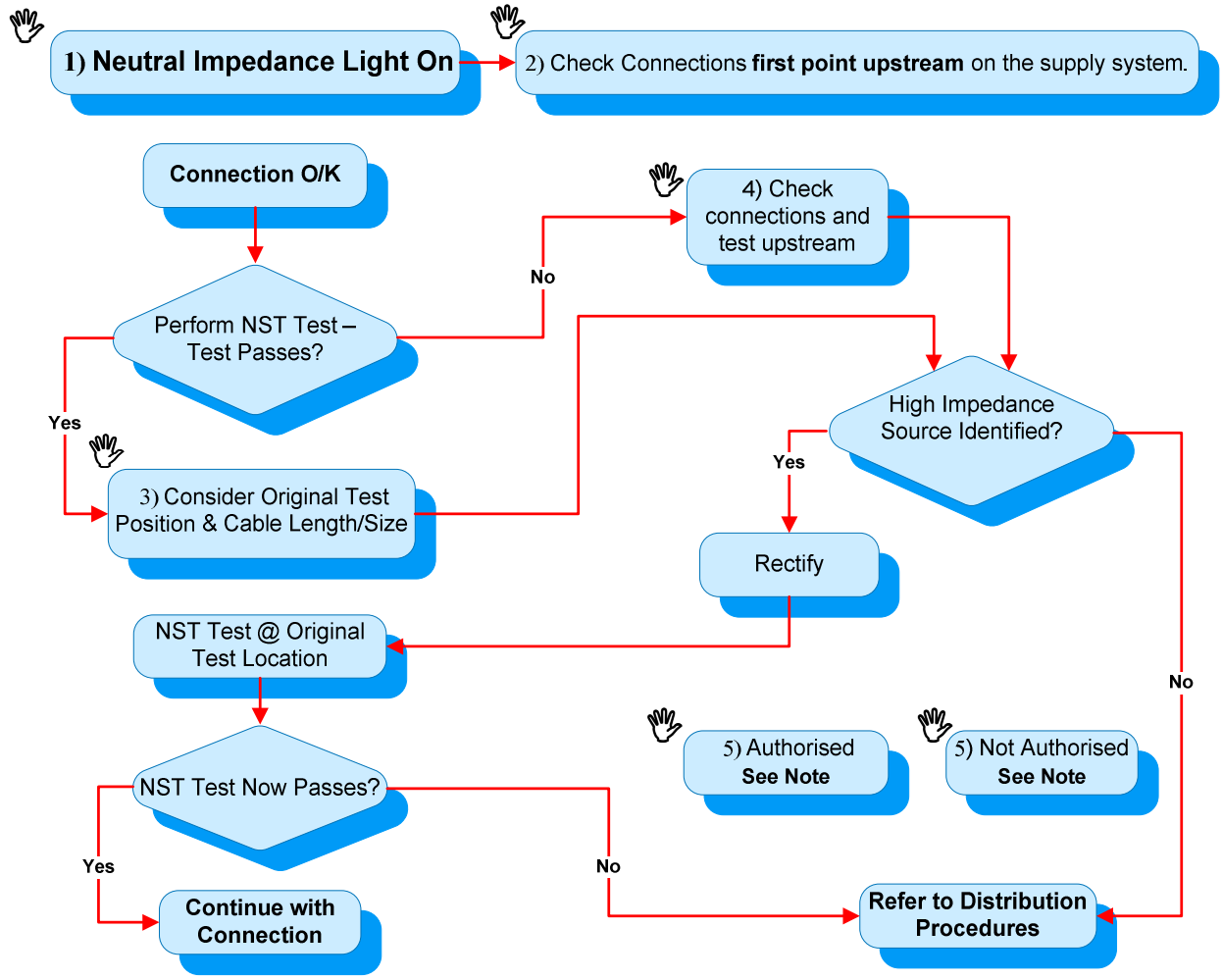
Handy Hints -

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.*

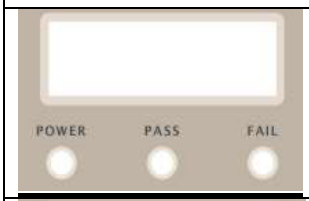
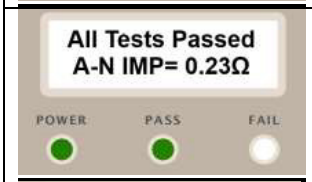
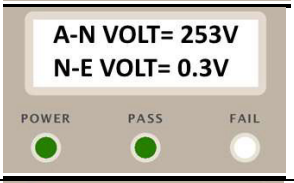
3) *Consider the original test position in relation to the cable length and size. An increase as low as .1Ω may result in a test failure when there is existing impedance of 1Ω upstream.*

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.

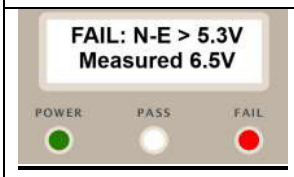
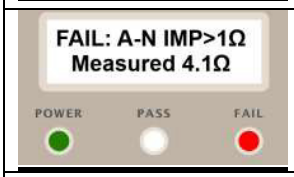
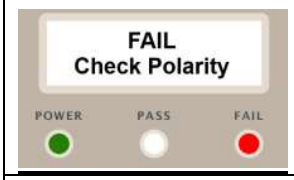
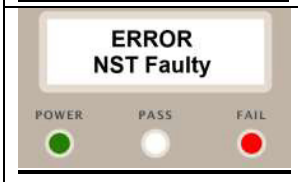
5) Sources of high impedance may include connections or conductors that are not the responsibility of persons involved in the connection process e.g. Licensed Electrical Contractors.
Note: Work shall only be conducted by persons authorised to perform such work in accordance with Section 1 Clause 1.10 of these procedures.

5.2B Digital Neutral Supply Tester (Model M1120) Screen display

Users of the Digital NST (M1120) 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 5.2A may assist personnel in identifying the cause to enable an appropriate response to rectify such faults.
.

LCD MESSAGE	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.	Normal testing cycle taking place
 	All measurements are within specifications. Screens 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

NST M1120 display cont …

LCD DISPLAY	DESCRIPTION	COMMENT
	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
	Active to Neutral impedance is above 1Ω threshold. The NST will beep every second until disconnected	Needs addressing and rectification A &/or N connection issues
	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

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5.3 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.

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5.4 Alternative Supplies

Introduction

Alternative supplies at electrical installations may take the form of either approved or non approved supply sources, and have potential to pose a serious electrical hazard to workers performing connection tasks.

Alternative supplies may include:

- Break before Make Alternative Supplies; (typically back up or emergency generation) Grid Connected Energy Systems via Inverters; (typically, solar photo voltaic cells, mini hydro generators, wind generators, etc).
- Portable generators
- Portable invertors
- Supplies from neighbouring properties and other such sources.

Non Approved Sources of Supply

Where non approved alternative supplies are identified the connection workers shall:

- Where authorised ensure the electrical installation is in a safe condition by either isolating or arranging the immediate isolation of the non-approved supply to the installation.
- Immediately notify the relevant Distribution Network Operator.
- Discontinue further connection works on the installation until notified by the Distribution Network Operator.

Approved Alternative Sources of Supply

Installations fitted with Break before Make alternative supplies shall have a prominent label fixed on the main switchboard, 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 switchboard must be clearly and permanently labelled as having an inverter energy system connected to it. The circuit breaker, fuse or switch must also be clearly labelled: and
- 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 at the consumer terminals and service fuse for underground supply.

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

- Where Break before Make alternative supplies are installed the worker shall ensure the isolation of the alternative supply from the Distribution System by visually checking the isolation point and where appropriate locking of devices.
- Where Grid Connected Energy Systems are installed the isolation switch connecting the alternative supply to the grid shall be turned to, and locked in, the open/off position: 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: These instructions do not apply to connection works involving other forms of Grid Connected Alternative Supplies.

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5.5 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 with the development of additional VESI connection procedures and the Government AMI smart meter program proposed in 2006 that required additional changes to the Electricity Safety Act.

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) " " " G33 11 Aug 2009

Extracts (in part) of these 3 Orders in Council are presented for general information in the following pages

Victoria Government Gazette **G 17** *29 April 1999*

Electricity Safety Act 1998
DECLARATION UNDER SECTION 4
Order In Council
The Governor in Council under section 4 of the **Electricity Safety Act 1998** declares that such of the provisions of this Act specified in this Order do not have effect to such extent as is specified -

Part 1
Section 4(1)(a) of the Electricity Safety Act 1998
Electrical contractors and electrical workers

Part 2
Section 4(1)(b) of the Electricity Safety Act 1998
Electrical equipment
1. Divisions 1, 2 and 3 (with the exception of section 43) of Part 3 of the Act do not have effect in relation to the following **electrical installations -**
Electrical installations -

(a) upstream of the point of supply except electrical installations used for the consumption of electricity by the electricity supplier;
(b) comprising of connections to consumers terminals for the purpose of providing electricity supply;
(c) owned by an electricity supplier for metering or the control or protection of metered or metering circuits;
(d) used in the operation of mining under licence within the meaning of the **Mineral Resources Development Act 1990**;
(e) comprising of fixed electrical equipment designed to be easily transportable connected to the electricity supply by the insertion of a plug into a socket designed for such a plug;
(a) used in a cathodic protection system or a mitigation system.

This Order is effective from 3 May 1999.
Dated 28 April 1999.
Responsible Minister:
ALAN R. STOCKDALE Treasurer

Victoria Government Gazette **G36** *5 Sept 2000*

Electricity Safety Act 1998
DECLARATION UNDER SECTION 4
Order in Council
The Governor in Council under Section 4 of the **Electricity Safety Act 1998** (the Act), declares that certain provisions of the Act specified in this Order, do not have effect to the extent specified-

Section 4(1)(a) of the Electricity Safety Act 1998
Electrical contractors and electrical workers.

1. Sections 30 and 36 of the Act do not have effect in relation to an **electrical contractor** contracting or undertaking to carry out the disconnection or reconnection of a consumers mains or submains neutral for the purpose of conducting neutral and polarity testing using a Victorian Electricity Supply Industry ("VESI"), Neutral and Supply Tester.

2. Sections 36 and 38(a) of the Act do not have effect in relation to an **electrical installation worker** disconnecting or reconnecting a consumers mains or submains neutral for the purpose of conducting neutral and polarity testing using a VESI Neutral and Supply Tester if the electricity supplier supplying or to supply electricity to the electrical installation has authorised the worker to carry out the testing and has certified that the worker has satisfactorily completed-

(b) the VESI Neutral and Supply Tester Course; and

(c) a practical assessment in performing the functions of the VESI Neutral and Supply Tester; and

(d) training in the safety aspects of the disconnection and reconnection of consumers mains or submains neutrals and of neutral and polarity testing; and

(e) a practical assessment in safely disconnecting and reconnecting consumers mains or submains neutrals; and

(e) training in the limitations of the work.

3. Sections 45(1) and 45A of the Act do not have effect in relation to a registered electrical contractor or a licensed electrical installations worker who is a responsible person under section 41A of the Act responsible for the carrying out of the disconnection or reconnection of a consumers mains or submains neutral for the purpose of conducting neutral and polarity testing using a VESI Neutral and Supply Tester.

Except where expressions are defined in the Act, expressions used in this Order have the same meaning as they have in the **Electricity Safety (Installations) Regulations 1999**.

This Order is effective from the date on which it is published in the Victoria Government Gazette [7 September 2000]

Dated 5 September 2000.

Victoria Government Gazette **G 33** *13 August 2009* *2207*

ORDERS IN COUNCIL
Electricity Safety Act 1998

AMENDMENT OF ORDER IN COUNCIL

The Lieutenant-Governor, as the Governor's Deputy, with the advice of the Executive Council, acting under section 4 of the **Electricity Safety Act 1998** ('the Act') makes the following amendment to the Order in Council made under section 4 of the Act on 28 April 1999 and published in the Government Gazette on 29 April 1999 (G17) and subsequently amended by Orders in Council published in the Government Gazette on 16 December 1999 (G50), 27 January 2000 (G4), 7 September 2000 (G36), 24 October 2002 (G43), 16 December 2004 (G51) and 19 October 2006 (G42):

For the first paragraph of clause 1 of Part 2 of the Order substitute –

1. Divisions 1, 2 (with the exception of section 39 but only for the purpose of clause 1(c) of this Order) and 3 (with the exception of section 43) of Part 3 of the Act do not have effect in relation to the following **electrical installations** –'

For clause 1(c) of Part 2 of the Order substitute –

'(c) used for metering or the control or protection of metering circuits, and equipment connected or to be connected to metering owned by a distribution company on the condition that only limited and ancillary electrical installation work that is necessary as part of the metering work is carried out. To maintain the integrity and safety of the customer's electrical installation the work must be carried out by a person who –

(i) possesses the qualifications, proficiency, competency and experience to at least Certificate III level or equivalent as a lineworker, meter technician or electrician to enable that work to be performed; and

(ii) has been properly trained in the safety aspects and limitations in relation to that work; and

(iii) has satisfactorily completed a course and practical assessment in accordance with the Certificate III ESI Distribution (Power Line) Metering Installations Unit or demonstrated equivalent competency; and

(iv) undertakes testing in accordance with the requirements of the Victorian Electricity Supply Industry (VESI): Installation Supply Connection Tests & Procedures manual to ensure integrity of supply to the customers main or occupancy switchboard or equipment to be supplied and the correct operation of metering equipment; and

(v) prior to enabling the electrical installation to be used by the customer verifies as far as practicable that the installation is safe to energise;
or.

(vi) is working under supervision as allowed under section 39 of the **Electricity Safety Act 1998** and such supervision is provided by a person who satisfies sub-paragraphs (i) through to (v) of this paragraph (c).'

Except where expressions are defined in the Act or otherwise defined in this Order, expressions used in this Order have the same meaning as they have in the Electricity Safety (Installations) Regulations 1999.

This Order is effective from the date on which it is published in the Government Gazette.
Dated 11 August 2009
Responsible Minister
PETER BATCHELOR MP
Minister for Energy and Resources
TOBY HALLIGAN
Clerk of the Executive Council

5.6 ESV Safety Alert

ELECTRICAL SAFETY ALERT

energysafe VICTORIA

25 Jan 2011

FAILING TO PERFORM A POLARITY TEST CAN KILL

Energy Safe Victoria has issued this Safety Alert to warn of the danger of failing to conduct an electrical test when installing metering equipment i.e. smart meters. The warning follows a number of reported reverse polarity incidents (transposition of active and neutral conductors of the consumer's mains cables) in Victoria during the last nine months.

Main Switchboard/Metering Enclosure

A reversed polarity of the consumers mains cables creates a life threatening situation to customers or anyone who contacts exposed metal parts connected to the installations main earth system, such parts include the metal meter box, metallic plumbing fixtures and the earthed frame of power tools and appliances.

Reversed polarity errors have been the cause of fatalities.

Smart Meter

The most recent reverse polarity connection was made during the replacement of an electricity meter at a residential property. It energized the meter box and metallic plumbing fittings (hot water unit, water taps, etc..) to 240 volts. A lady received an electric shock to her hand when turning a water tap at the rear of the property.

Line and Load Terminals of the Smart Meter

Victoria's Director of Energy Safety, Mr Paul Fearon said: *"ESV has a zero tolerance when it comes to reverse polarity connections. It is crucial that appropriate electrical tests be conducted when connecting or reconnecting supply to a customer's installation.*

"ESV will take action against workers if they fail to perform the required tests, and electricity companies must ensure that a safe system is effectively implemented to ensure service connections are correct."

Mr. Fearon stressed that safety must never be compromised and workers must adhere to safe work procedure.

Failing to perform a polarity test is NON NEGOTIABLE.

Paul Fearon
DIRECTOR OF ENERGY SAFETY

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