



# Section 4.

## Connection Procedures

“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

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## 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:

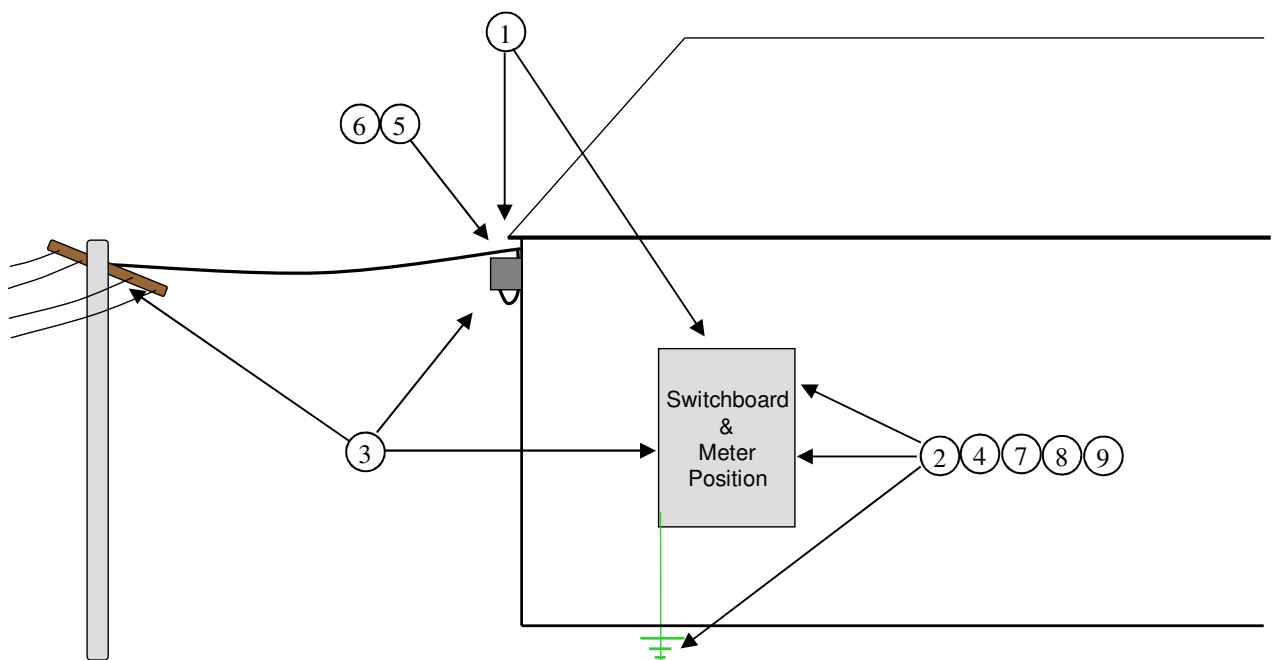
- Providing correct polarity of electrical connections to the customer's main switchboard.
- Providing a supply neutral of less than 1  $\Omega$  impedance to the customer's main switchboard.
- Providing correct phase sequence to the customer's main switchboard.
- Maintaining safe systems of work during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

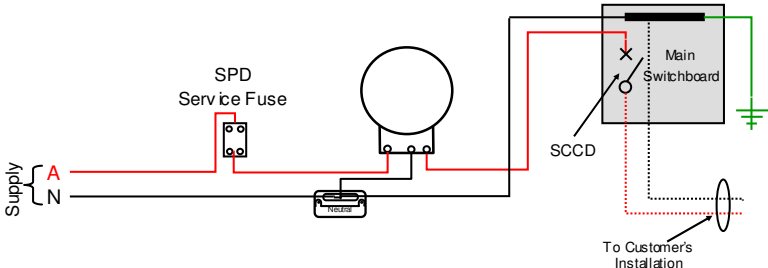
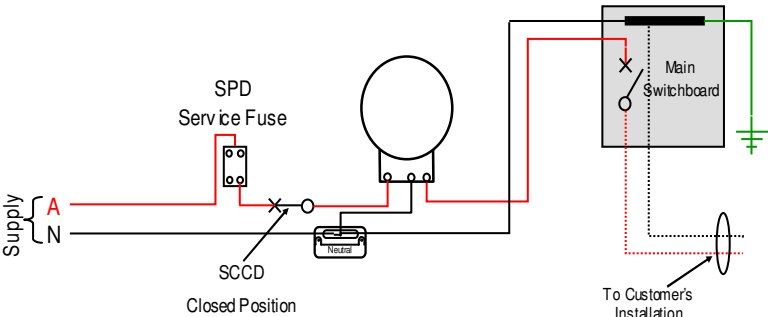
**Location 2** Unmetered mains between the Service Protection Device (SPD) and the Metering Equipment.

**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:

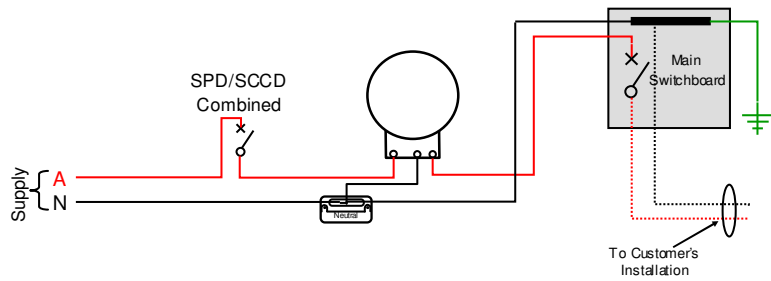
#### Typical Arrangements

<p><b>Location 1</b></p> <p>No additional action required.</p>	
<p><b>Location 2</b></p> <p>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.</p>	 <p><i>Some situations exist but- now no longer permitted</i></p>

### 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

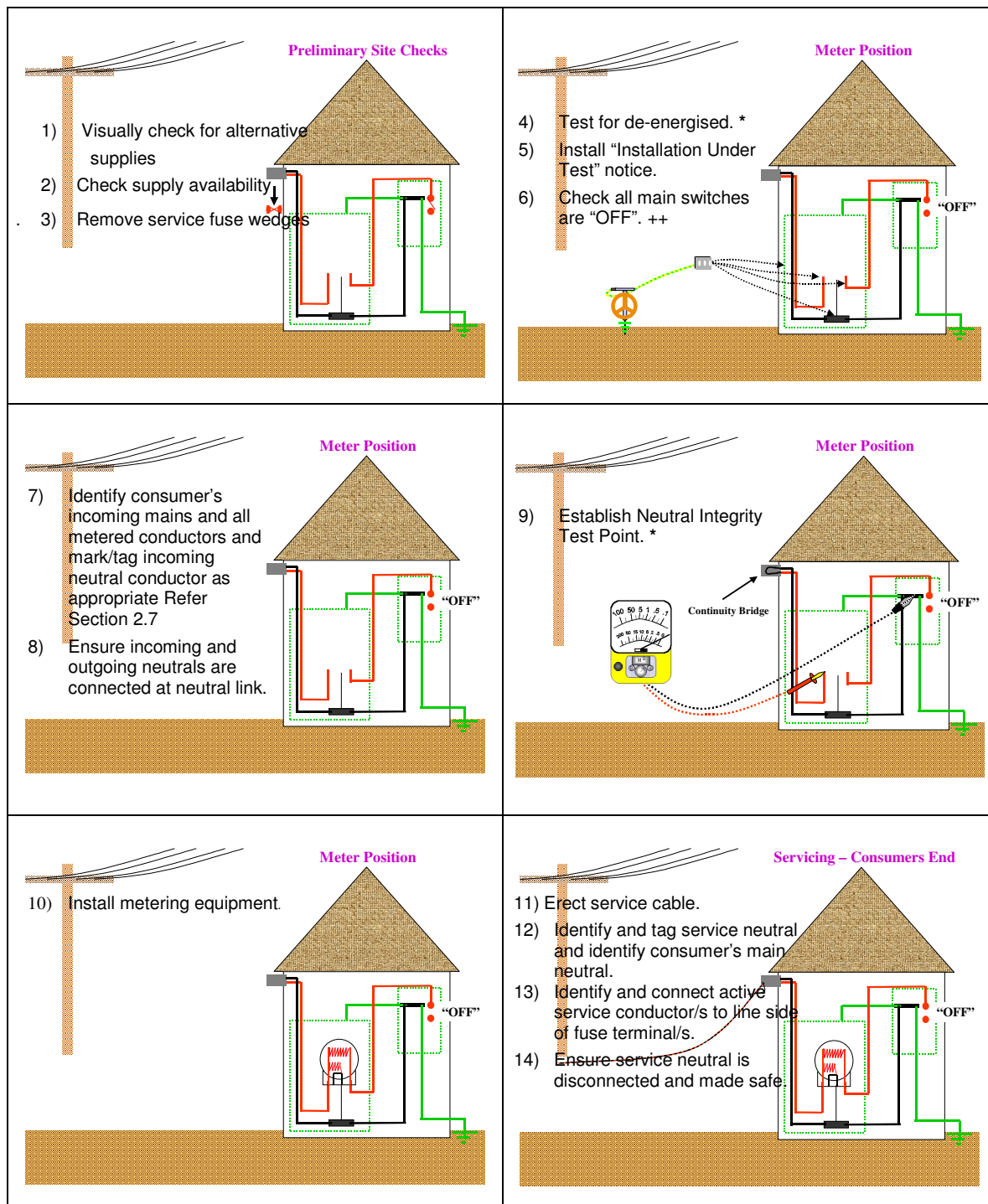
18. Polarity Test service cable conductors. \*
19. NST incoming customers neutral. \*
20. Connect Service Neutral to Consumers Mains Neutral.
21. Check Test/s (includes switched circuits) \*
22. Leave service fuse/s inserted
23. NST Test to Neutral Integrity Test Point. \*

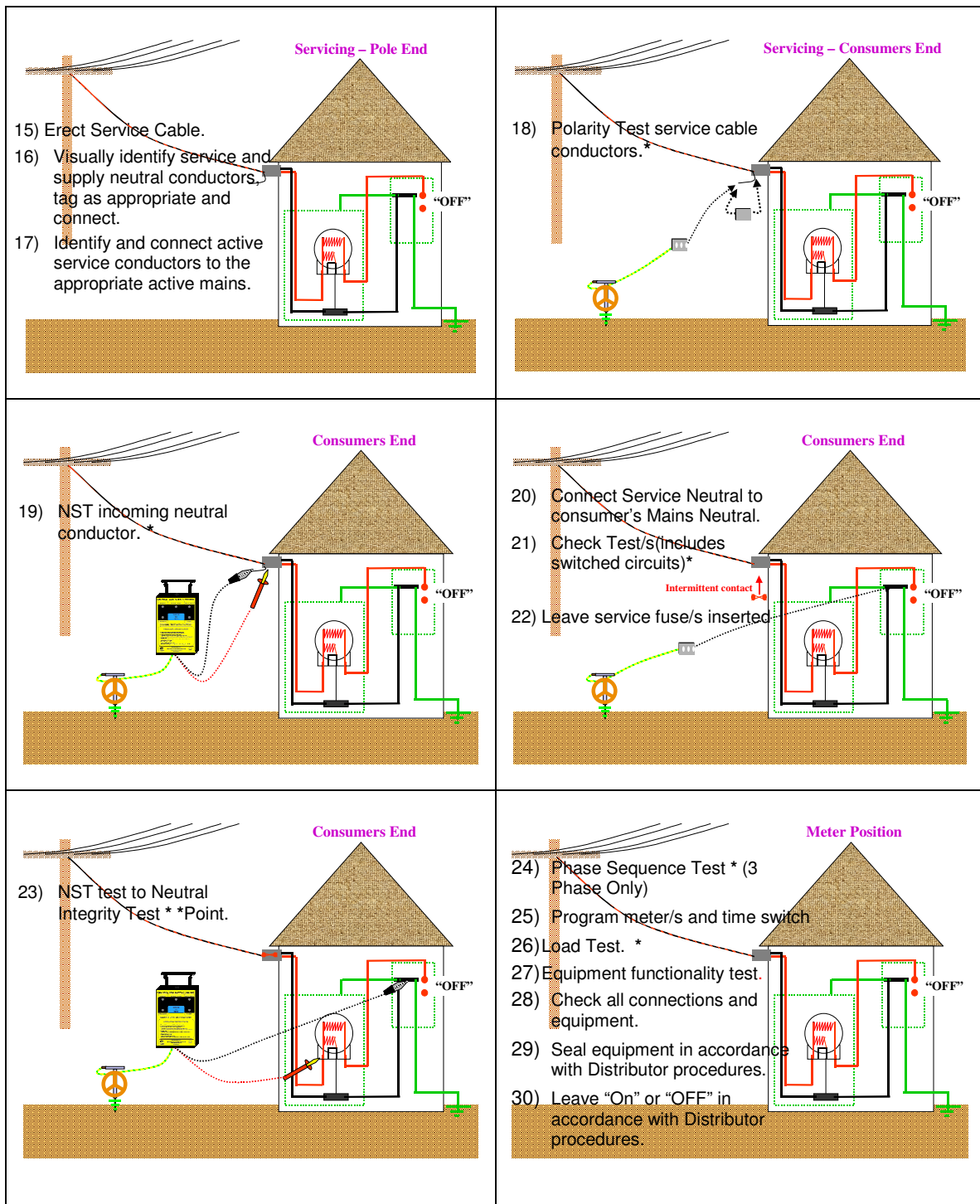
### Meter Position

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.





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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.

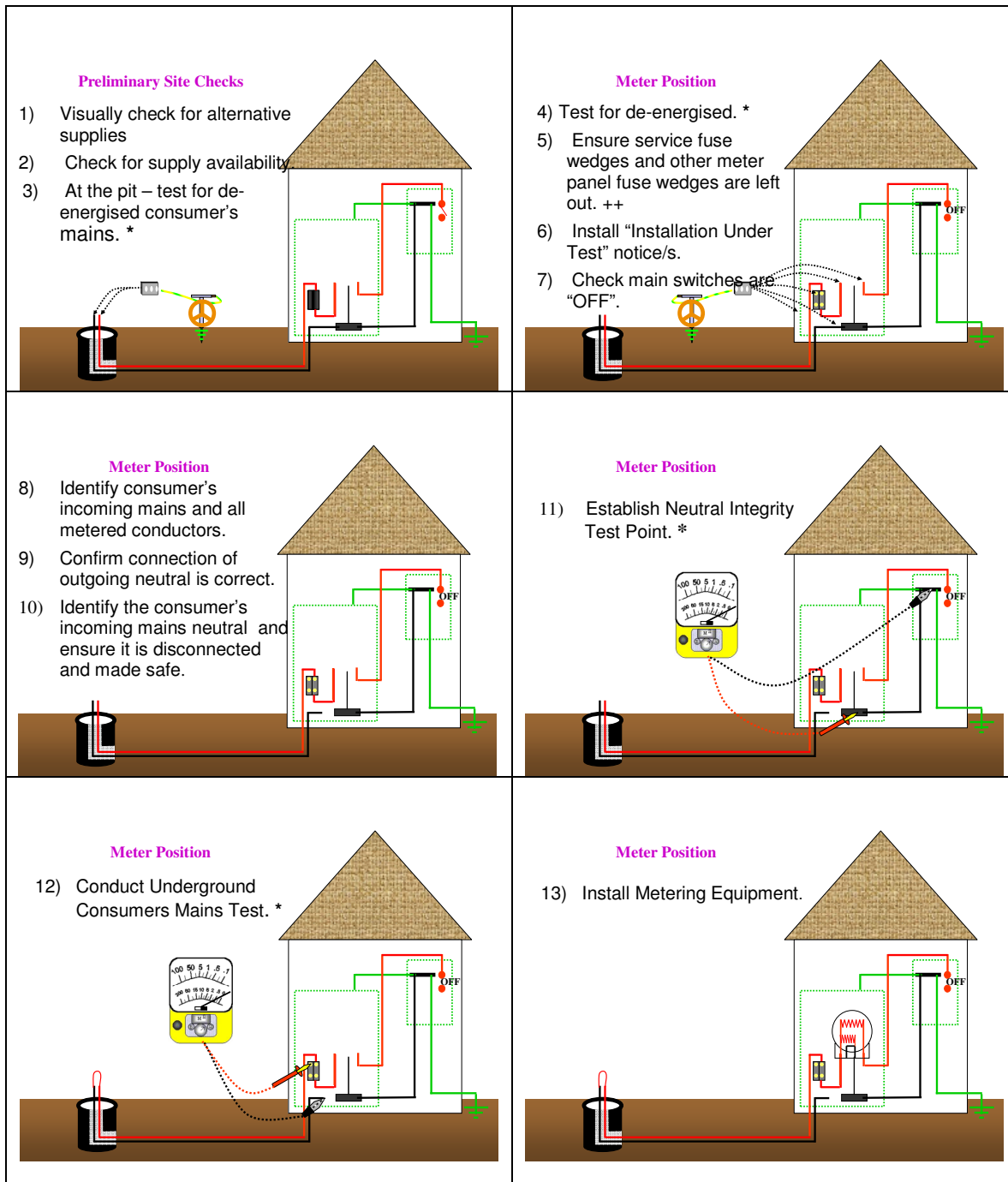
### Pit

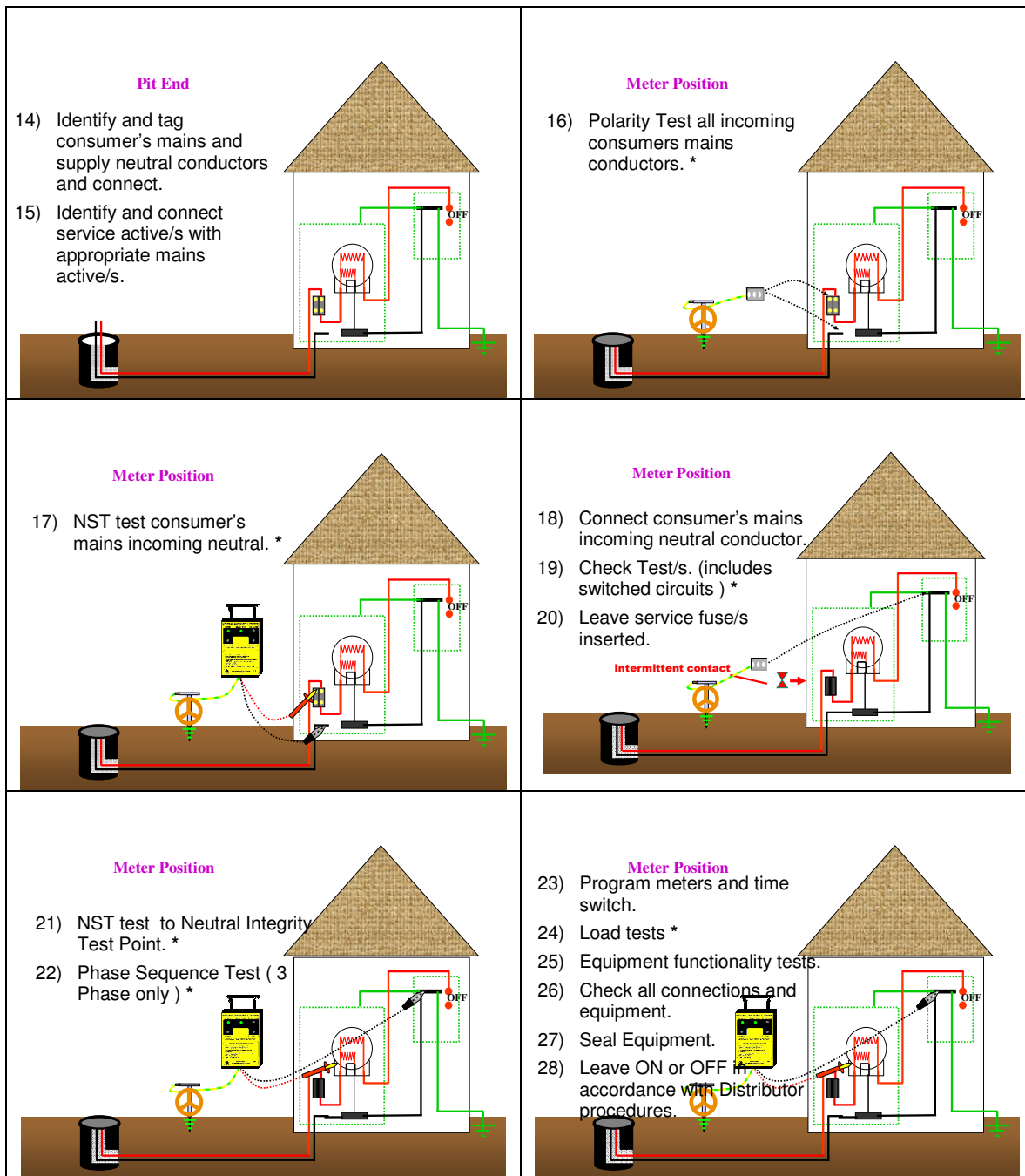
14. Identify and tag consumer's mains and supply neutral conductors and connect.
15. Identify and connect service active/s with appropriate mains active/s.

### 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.





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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.

**Preliminary Site Checks (all unmetered portions and remote main switchboards)**

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

**Supply Point**

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

**Point to be Connected / Switchboard / Meter position**

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

**Supply Point**

**For an underground connection:**

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

**For an overhead connection:**

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

- 18a. Energise the point to be connected.

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

*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

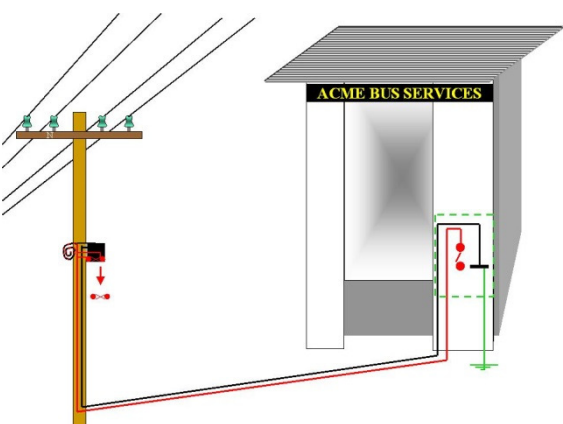
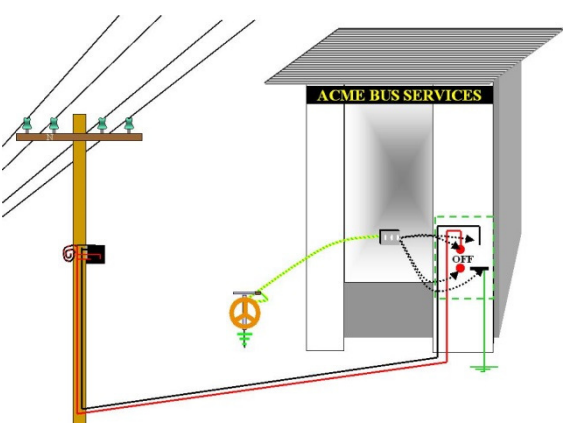
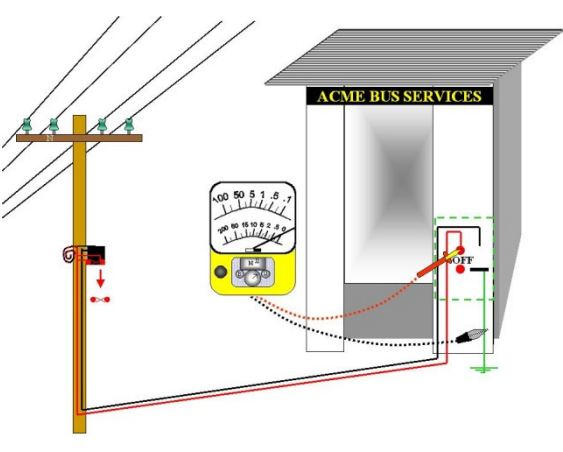
### **Consumers End – Switchboard**

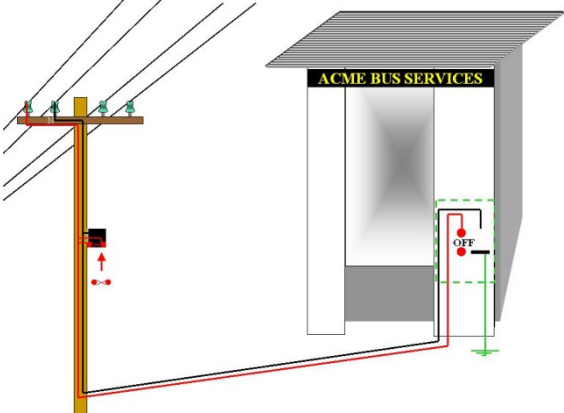
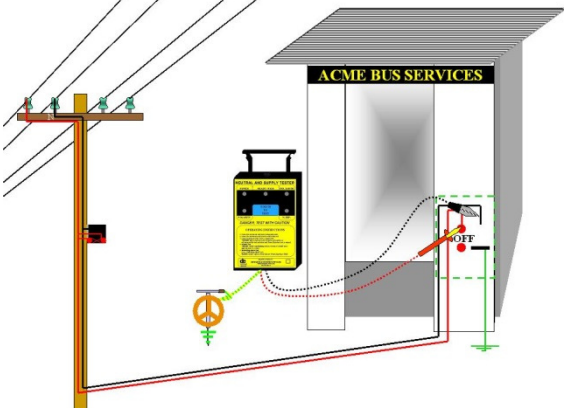
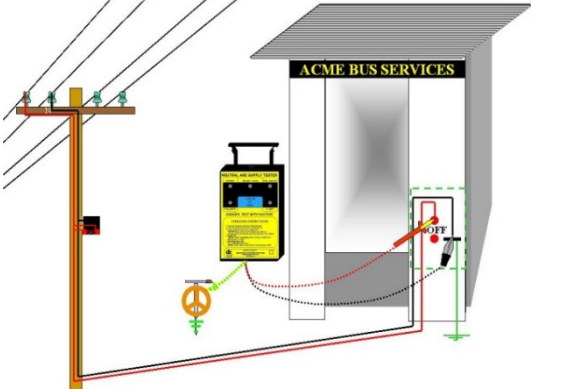
13. Polarity Test \*
14. NST Test incoming neutral. \*
15. Connect incoming neutral to MEN bar
16. NST Test to MEN bar.\*
17. Phase sequence Test (3 phase only)
18. Check all connections and equipment.
19. Leave "On" or "Off" in accordance with Distributors procedures.

\* Refer to individual testing procedures.

## Unmetered supply- Not associated with Multiple Occupancies

*Typical Arrangement*

	<p><b>Preliminary Site Checks</b></p> <ol style="list-style-type: none"> <li>1) Visually check for alternative supplies.</li> <li>2) Check for supply availability.</li> <li>3) Remove service fuse/s (Where Applicable)</li> </ol>
	<p><b>Consumers End - Switchboard</b></p> <ol style="list-style-type: none"> <li>4) Test for de-energised. *</li> <li>5) Install "Installation Under Test" notice.</li> <li>6) Ensure consumers main switch/s are "OFF"</li> <li>7) Identify incoming active and neutral supply conductors</li> <li>8) Disconnect incoming neutral and make safe.</li> </ol>
	<p><b>Consumers End – Switchboard</b></p> <ol style="list-style-type: none"> <li>9) Conduct Underground Consumers Mains Test. (As Applicable)*</li> </ol>

	<p><b>Supply End</b></p> <ol style="list-style-type: none"> <li>10) Visually identify supply neutral conductors, tag as appropriate and connect.</li> <li>11) Visually identify supply active conductors and connect.</li> <li>12) Energise consumer's mains</li> </ol>
	<p><b>Consumers End – Switchboard</b></p> <ol style="list-style-type: none"> <li>13) Polarity Test *</li> <li>14) NST Test incoming neutral. *</li> </ol>
	<p><b>Consumers End – Switchboard</b></p> <ol style="list-style-type: none"> <li>15) Connect incoming neutral to MEN bar</li> <li>16) NST test to MEN bar.*</li> <li>17) Phase sequence test (3 phase only)</li> <li>18) Check all connections and equipment.</li> <li>19) Leave "On" or "Off" in accordance with Distributors procedures.</li> </ol>

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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.

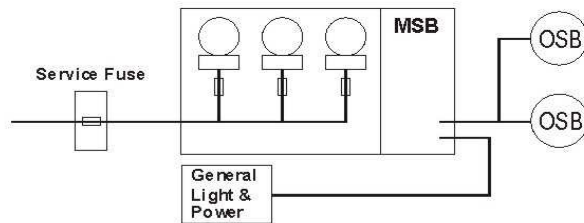
**Occupancy Switch board**

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.

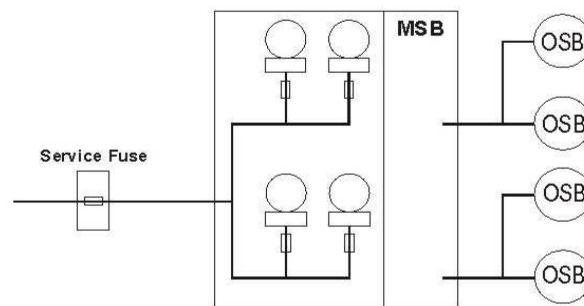
\* Refer to individual testing procedures

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

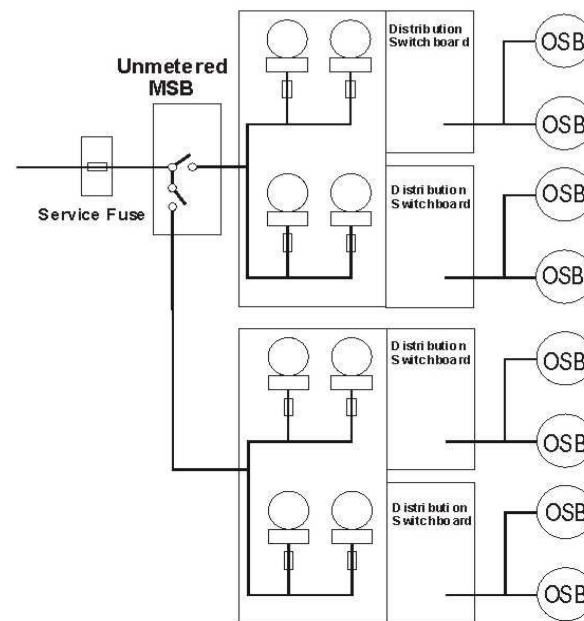
## TYPICAL LAYOUTS FOR MULTIPLE OCCUPANCIES - DIRECT METERED



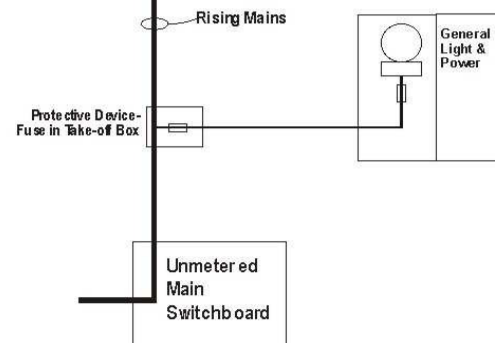
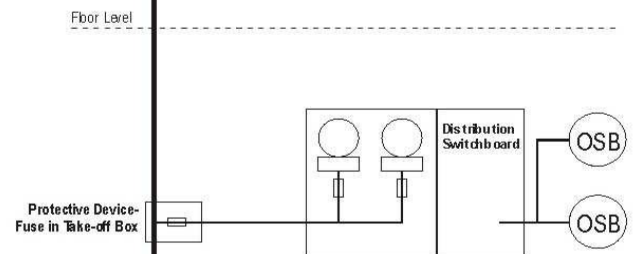
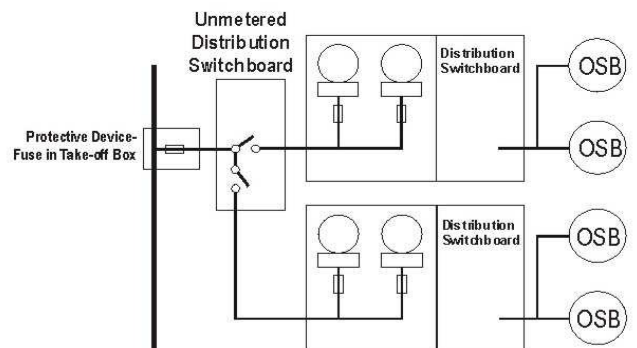
**Two or More Occupancies  
Plus General Light & Power  
Single (Common) Meter Position**



**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. c.d.n. Rev. 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.


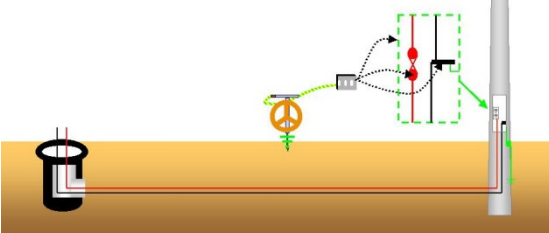


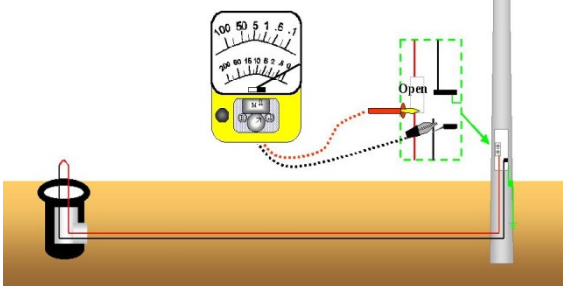

### **Lighting Column End**

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.

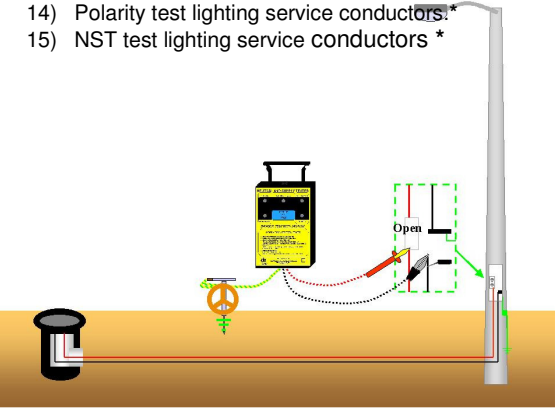
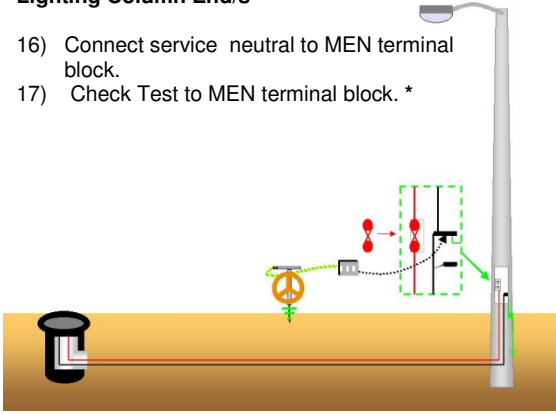
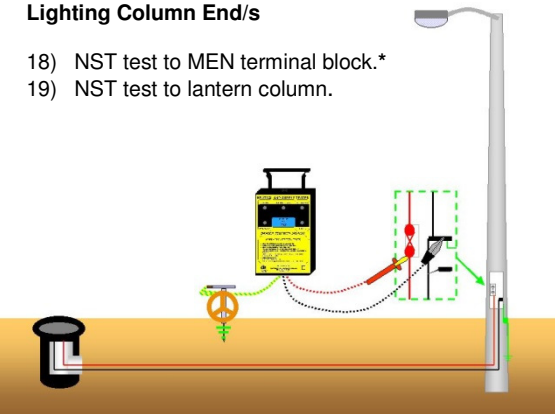
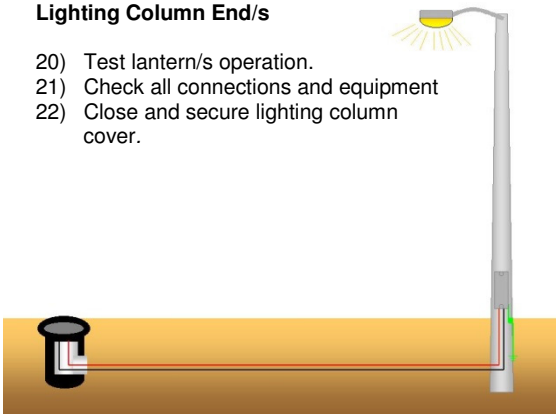
\* Refer to individual test procedures.

## Public Lighting - With Switchboard

*Typical Arrangement Lighting Column shown*

<p><b>Preliminary Site Checks</b></p> <ol style="list-style-type: none"> <li>1) Visually check for alternative supplies.</li> <li>2) Check for supply availability</li> <li>3) At the Supply End test lighting service conductors for de-energised *</li> </ol> 	<p><b>Lighting Column End/s</b></p> <ol style="list-style-type: none"> <li>4) Test for de-energised*</li> <li>5) Install "Installation Under Test" notice.</li> </ol> 
<p><b>Lighting Column End/s</b></p> <ol style="list-style-type: none"> <li>6) Identify lighting incoming service conductors and lantern supply conductors.</li> <li>7) Confirm MEN terminal block, earth stud and earth rod connections are complete (as applicable).</li> </ol> 	<p><b>Lighting Column End/s</b></p> <ol style="list-style-type: none"> <li>8) Ensure lantern fitting/s and associated wiring is complete.</li> <li>9) Ensure incoming supply active is appropriately isolated.</li> </ol> 
<p><b>Lighting Column End/s</b></p> <ol style="list-style-type: none"> <li>10) Tag the incoming lighting service neutral and ensure neutral is disconnected and made safe.</li> <li>11) Conduct Underground Consumers Mains Test on the lighting service conductors. *</li> </ol> 	<p><b>Supply End</b></p> <ol style="list-style-type: none"> <li>12) Identify and tag lighting mains neutral and supply neutral conductors and connect.</li> <li>13) Identify lighting mains active and supply active conductors and connect.</li> </ol> 

## Public Lighting - With Switchboard .....cont

<p><b>Lighting Column End/s</b></p> <p>14) Polarity test lighting service conductors.* 15) NST test lighting service conductors *</p> 	<p><b>Lighting Column End/s</b></p> <p>16) Connect service neutral to MEN terminal block. 17) Check Test to MEN terminal block. *</p> 
<p><b>Lighting Column End/s</b></p> <p>18) NST test to MEN terminal block.* 19) NST test to lantern column.</p> 	<p><b>Lighting Column End/s</b></p> <p>20) Test lantern/s operation. 21) Check all connections and equipment 22) Close and secure lighting column cover.</p> 

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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  $\Omega$  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.

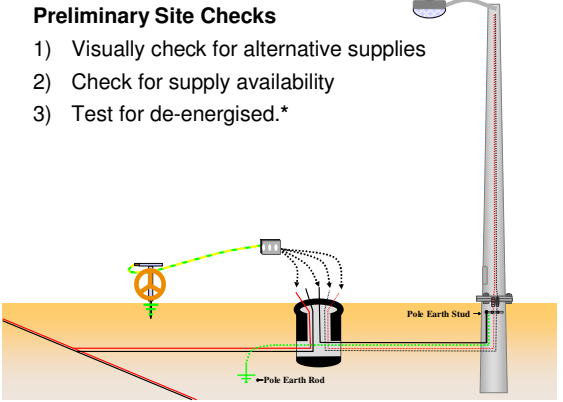
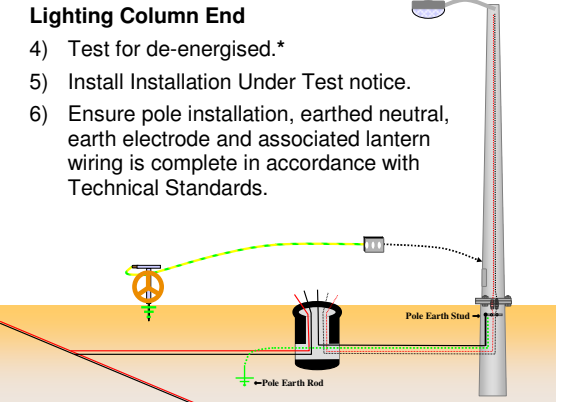
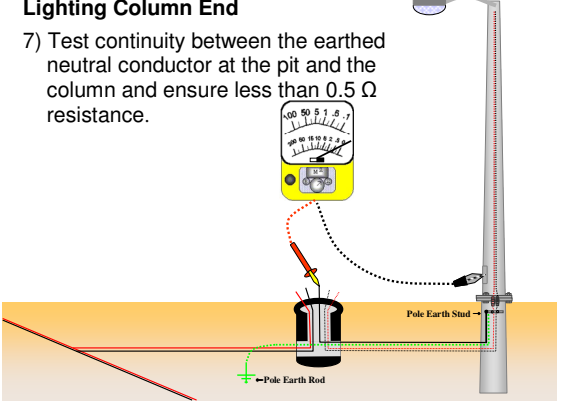
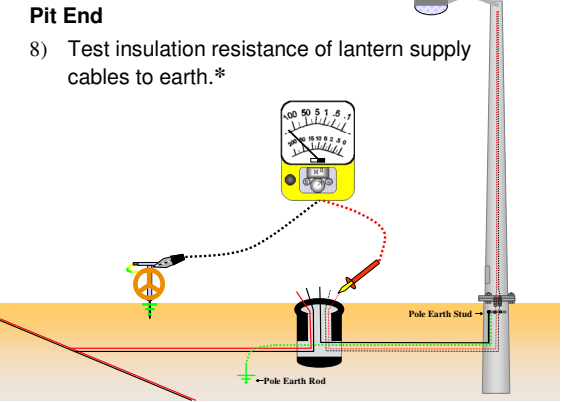
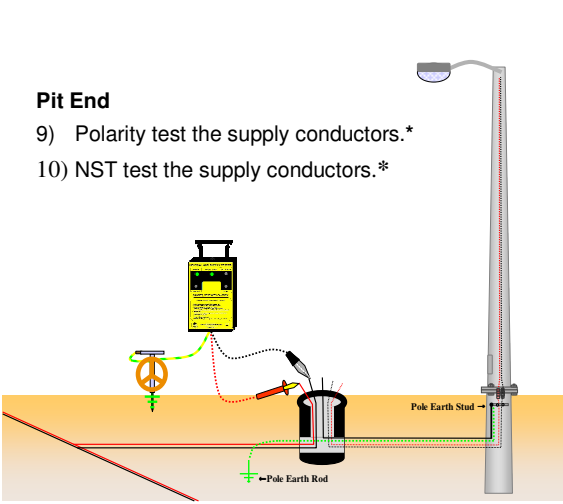
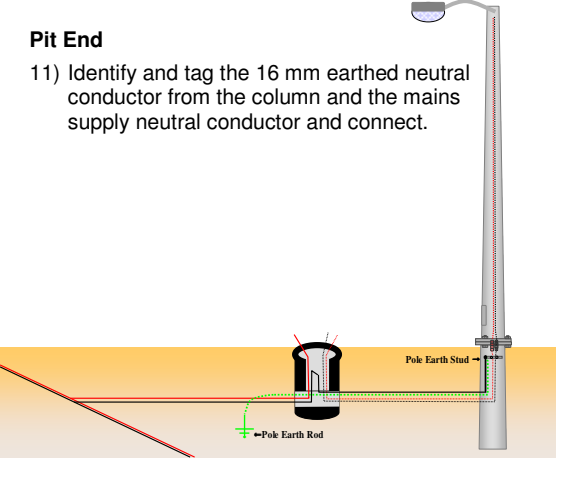
### **Lighting Column End**

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

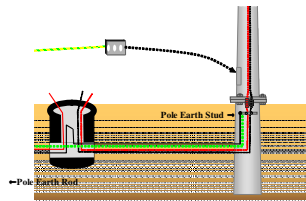
## Public Lighting-Without Switchboard

*Typical arrangement slip base/frangible column demonstrated*

<p><b>Preliminary Site Checks</b></p> <ol style="list-style-type: none"> <li>1) Visually check for alternative supplies</li> <li>2) Check for supply availability</li> <li>3) Test for de-energised.*</li> </ol> 	<p><b>Lighting Column End</b></p> <ol style="list-style-type: none"> <li>4) Test for de-energised.*</li> <li>5) Install Installation Under Test notice.</li> <li>6) Ensure pole installation, earthed neutral, earth electrode and associated lantern wiring is complete in accordance with Technical Standards.</li> </ol> 
<p><b>Lighting Column End</b></p> <ol style="list-style-type: none"> <li>7) Test continuity between the earthed neutral conductor at the pit and the column and ensure less than 0.5 <math>\Omega</math> resistance.</li> </ol> 	<p><b>Pit End</b></p> <ol style="list-style-type: none"> <li>8) Test insulation resistance of lantern supply cables to earth.*</li> </ol> 
<p><b>Pit End</b></p> <ol style="list-style-type: none"> <li>9) Polarity test the supply conductors.*</li> <li>10) NST test the supply conductors.*</li> </ol> 	<p><b>Pit End</b></p> <ol style="list-style-type: none"> <li>11) Identify and tag the 16 mm earthed neutral conductor from the column and the mains supply neutral conductor and connect.</li> </ol> 

### 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.

Pole Earth Stud →

← Pole Earth Rod

### 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.

Pole Earth Stud →

← Pole Earth Rod

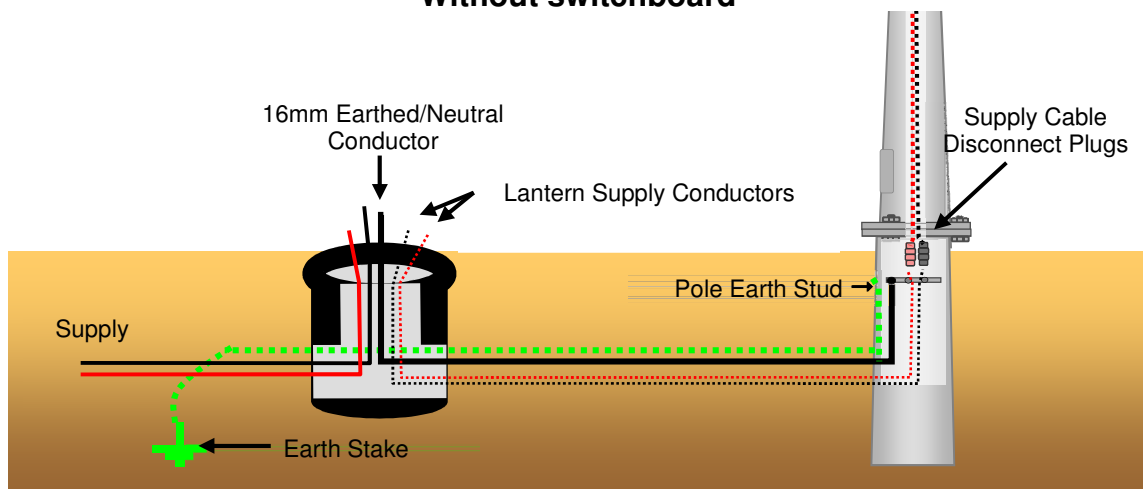
### Lighting Column End

- 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.

Pole Earth Stud →

← Pole Earth Rod

## 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.

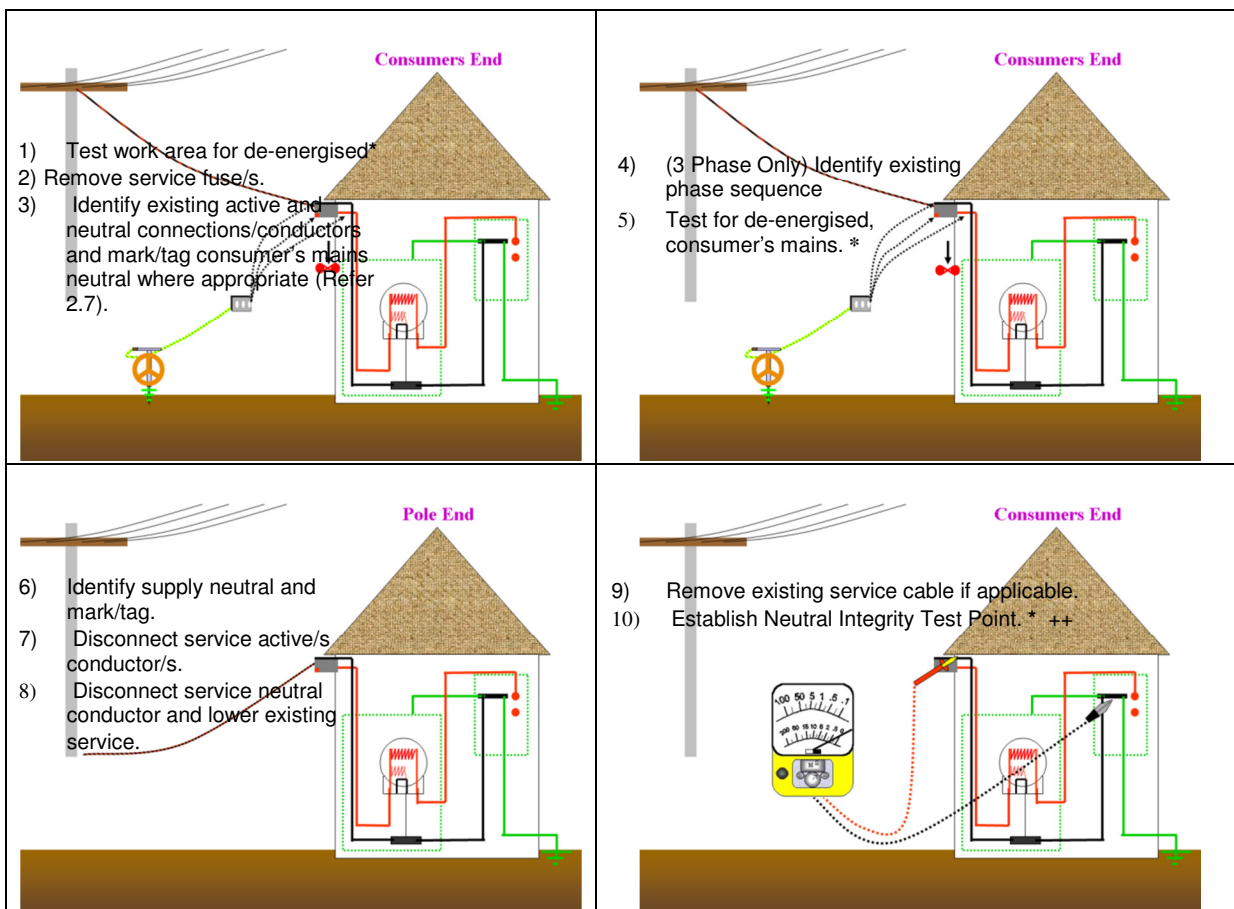
### **Servicing – Consumers End**

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"



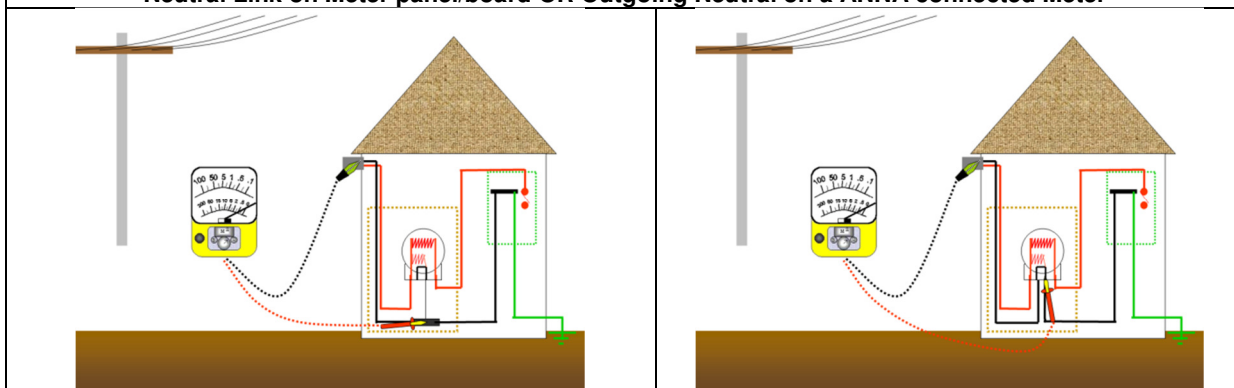
### ++ ALTERNATIVE TEST WHERE NITP NOT ACCESSIBLE

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

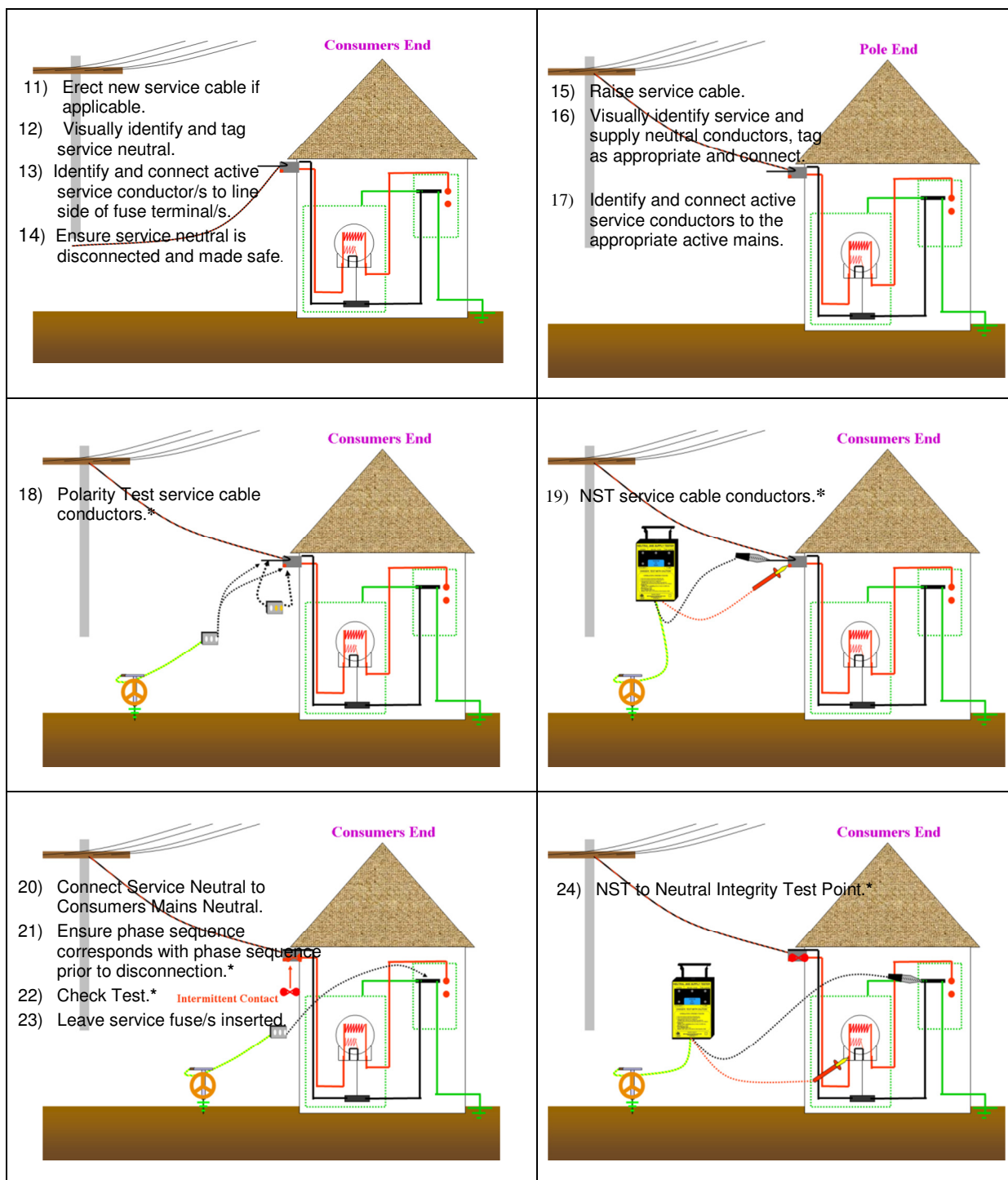
Where the 3 normal NITPs are inaccessible in replacement overhead procedures (service protection device – load end), the connector may substitute the NITP test with a continuity test between the point of supply and the outgoing neutral at the customers metering position as demonstrated below.

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)

Existing Installation: Replacement or Disconnection & Reconnection UG Consumer Mains up to 100A Single Occupancy supplied from a pit - Service cable “On or Off” supply	Issue: 1 01.01.2017	Page 1 of 2
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*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.

Existing Installation: Replacement or Disconnection & Reconnection UG Consumer Mains up to 100A Single Occupancy supplied from a pit - Service cable "On or Off" supply	Issue: 1 01.01.2017	Page 2 of 2
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#### **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 (i.e Testing as per single occupancy)

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

### **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.

Existing Installation: Replacement or Disconnection & Reconnection UG Consumer Mains up to 100A Multiple Occupancy Supplied from a Pit - Service cable "On or Off" supply	Issue: 1 01.01.2017	Page 1 of 2
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*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.

Existing Installation: Replacement or Disconnection & Reconnection UG Consumer Mains up to 100A Multiple Occupancy Supplied from a Pit - Service cable "On or Off" supply	Issue: 1 01.01.2017	Page 2 of 2
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## **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 \* ++

Existing Installation: Replacement or Disconnection & Reconnection Underground Service Greater than 100A – Single or Multiple Occupancy	Issue: 1 01.01.2017	Page 1 of 4
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..... 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

Existing Installation: Replacement or Disconnection & Reconnection Underground Service Greater than 100A – Single or Multiple Occupancy	Issue: 1 01.01.2017	Page 2 of 4
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..... *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 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.

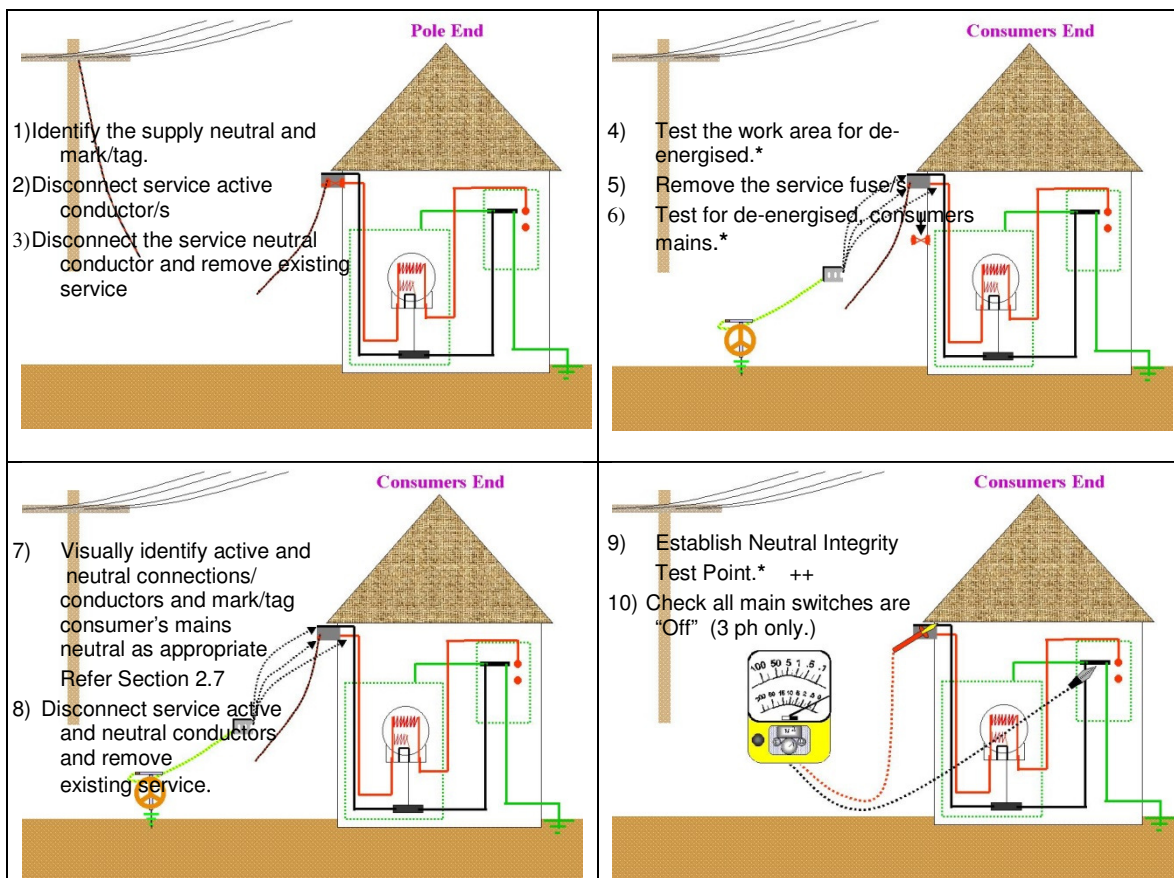
### **Consumers End**

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”

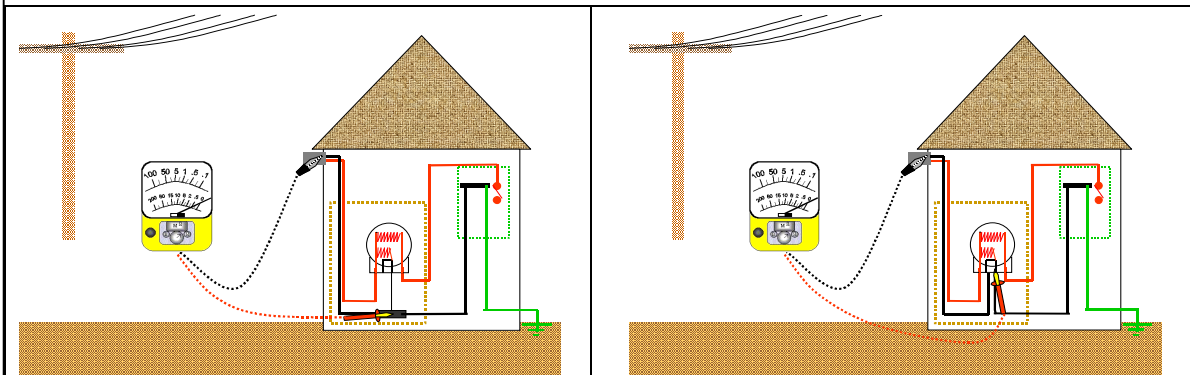


### ++ ALTERNATIVE TEST WHERE NITP NOT ACCESSIBLE

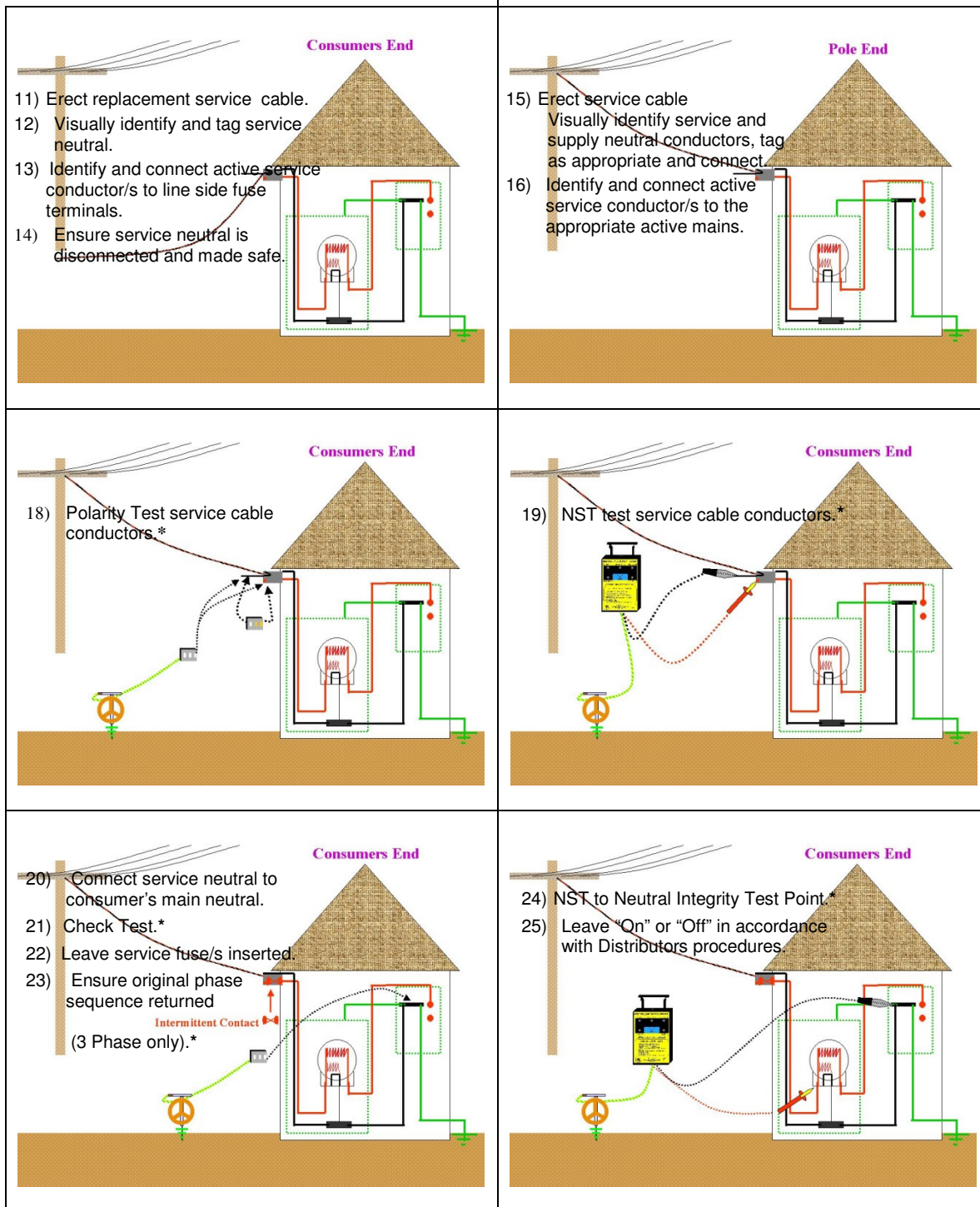
**This variation is only permitted for service replacement procedures where the service protection device is at the load end.**

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.



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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**

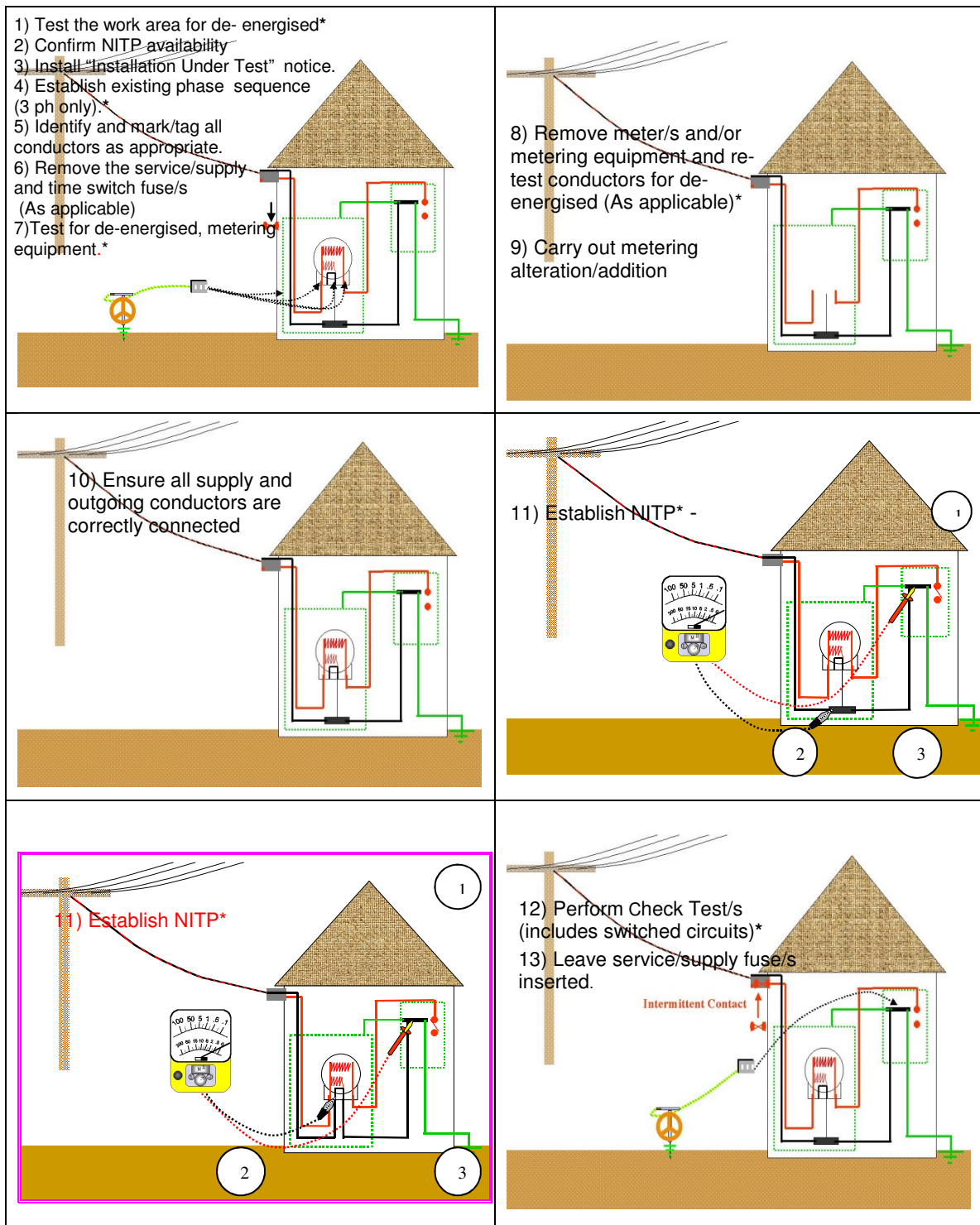
1. Test the work area for de-energised. \*
2. Visually confirm NITP availability.
3. Install “Installation Under Test” notice/s.
4. Establish existing phase sequence (3 phase only) \*
5. Identify and mark/tag all conductors as appropriate.
6. Remove the service/supply & time switch fuse/s (As applicable)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

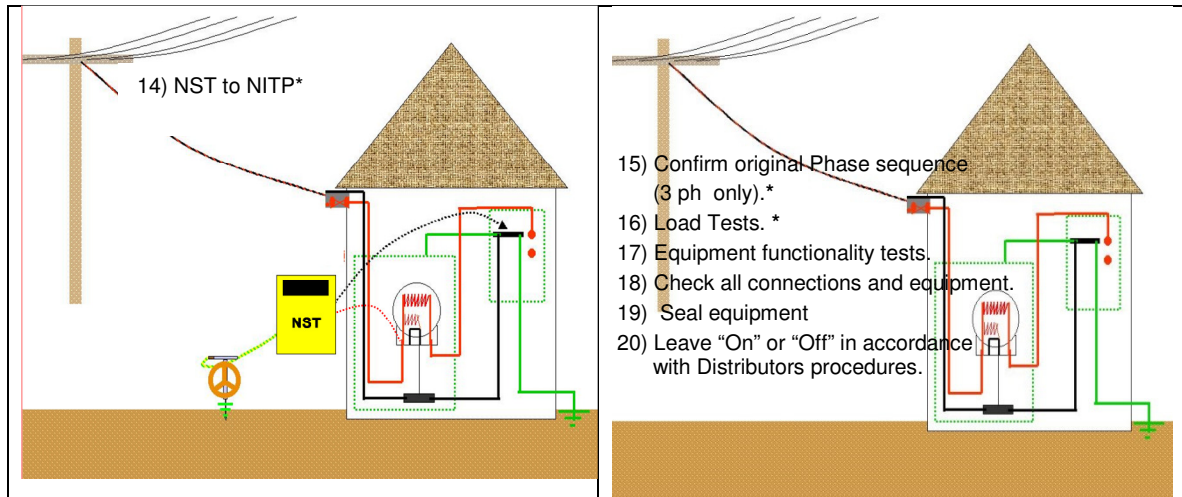


## Single Occupancy:- Meter Alteration and/or Additions – direct metering

### Typical Arrangement







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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)*

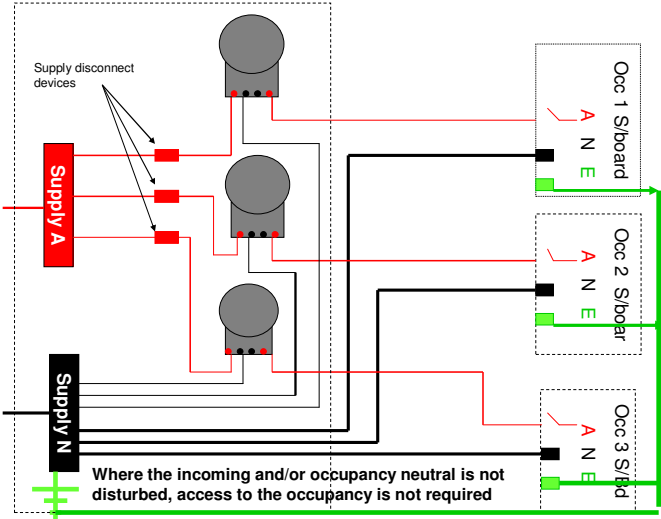
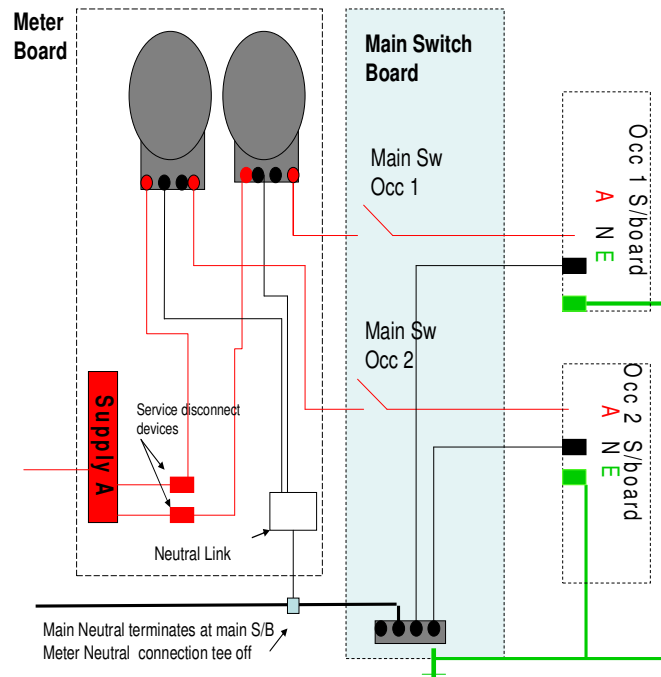
This procedure shall be used for MO configurations where the metering is supplied by a single metering neutral conductor **and** the main neutral conductors are “**not disturbed**” as per the definition.

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	
 <p>Where the incoming and/or occupancy neutral is not disturbed, access to the occupancy is not required</p>	<p><b>Meter and occupancy neutrals terminated in links at meter position.</b></p> <ul style="list-style-type: none"> <li>- Metering is supplied by single metering neutral conductor.</li> <li>- Main earth terminated /connected at Meter board supply Neutral Link.(MEN)</li> </ul> <p>This MEN link is a valid NITP without further test.</p> <p>A Neutral bar/link at a meter board remote to the MEN link is also a valid NITP without further test</p>
 <p>Main Neutral terminates at main S/B Meter Neutral connection tee off</p>	<p><b>Supply neutral terminated at main switchboard</b></p> <ul style="list-style-type: none"> <li>- Metering is supplied by single metering neutral conductor.</li> <li>- Main earth terminated /connected at MEN bar on main switchboard</li> </ul> <p>This MEN link is a valid NITP without further test.</p> <p>A Neutral bar/link at a meter board remote to the MEN link is also a valid NITP without further test</p>

#### **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.

Existing installation: Multiple Occupancy Meter Alteration and/or Additions – Direct Metering Neutral Disturbed	Issue: 1    03.01.2011	Page 1 of 4
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*Multiple 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.

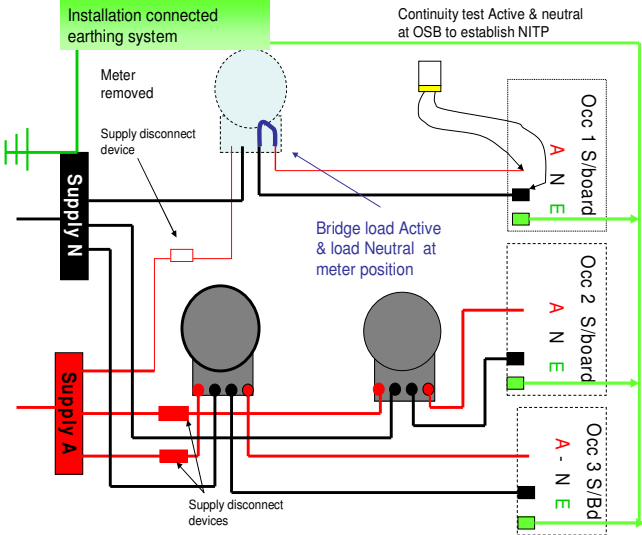
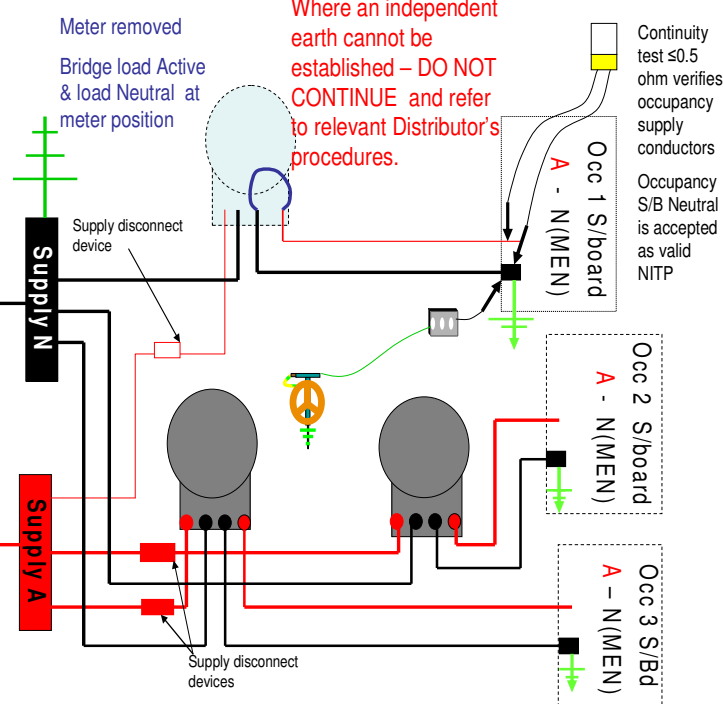
\* Refer to individual test procedures and the following diagrams

**++ 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	
 <p>Installation connected earthing system</p> <p>Meter removed</p> <p>Supply disconnect device</p> <p>Continuity test Active &amp; neutral at OSB to establish NITP</p> <p>Bridge load Active &amp; load Neutral at meter position</p> <p>Supply A</p> <p>Supply N</p> <p>Supply disconnect devices</p> <p>Occ 1 S/board A - N - E</p> <p>Occ 2 S/board A - N - E</p> <p>Occ 3 S/Bd A - N - E</p>	<p><b>Occupancy Switchboard, Neutral &amp; Earth Bars separated:-</b></p> <p>Install bridge between load active &amp; load neutral at Meter position.</p> <p>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</p>
 <p>Meter removed</p> <p>Bridge load Active &amp; load Neutral at meter position</p> <p>Supply disconnect device</p> <p>Where an independent earth cannot be established – DO NOT CONTINUE and refer to relevant Distributor's procedures.</p> <p>Continuity test <math>\leq 0.5</math> ohm verifies occupancy supply conductors</p> <p>Occupancy S/B Neutral is accepted as valid NITP</p> <p>Occ 1 S/board A - N (MEN)</p> <p>Occ 2 S/board A - N (MEN)</p> <p>Occ 3 S/Bd A - N (MEN)</p> <p>Supply A</p> <p>Supply N</p> <p>Supply disconnect devices</p>	<p><b>MEN at Occupancy Switchboard-</b></p> <p>Confirm an independent earth can be established-</p> <p>Install bridge between load active &amp; load neutral at meter position</p> <p>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</p> <p><b>NOTE:-If an independent earth cannot be established, the MEN/earthing system cannot be used as an independent earth.</b></p> <p>Where an independent earth cannot be established – DO NOT CONTINUE and refer to relevant Distributor's procedures.</p>

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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.

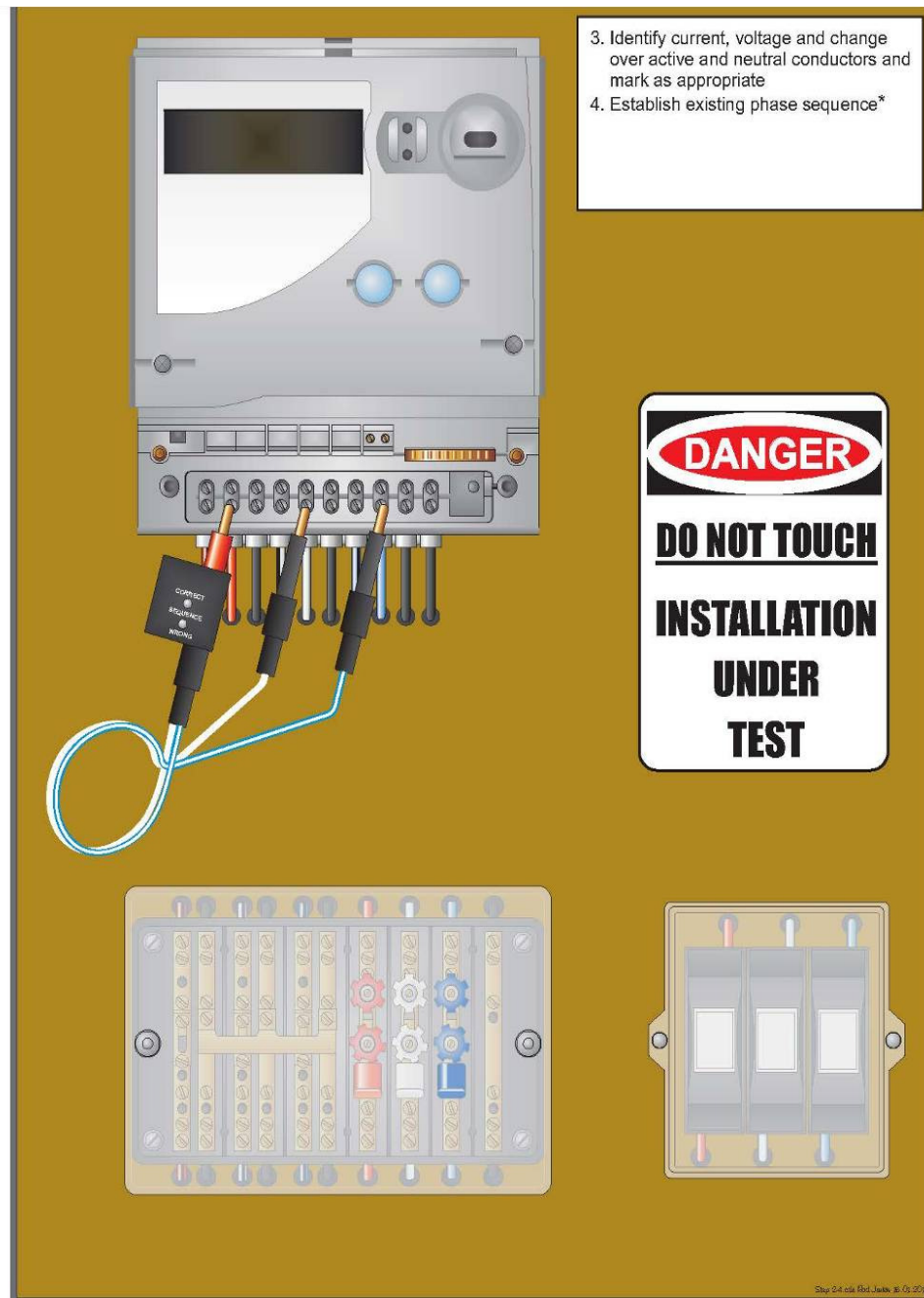
## Alteration and /or Additions- CT metering

*Typical arrangement*

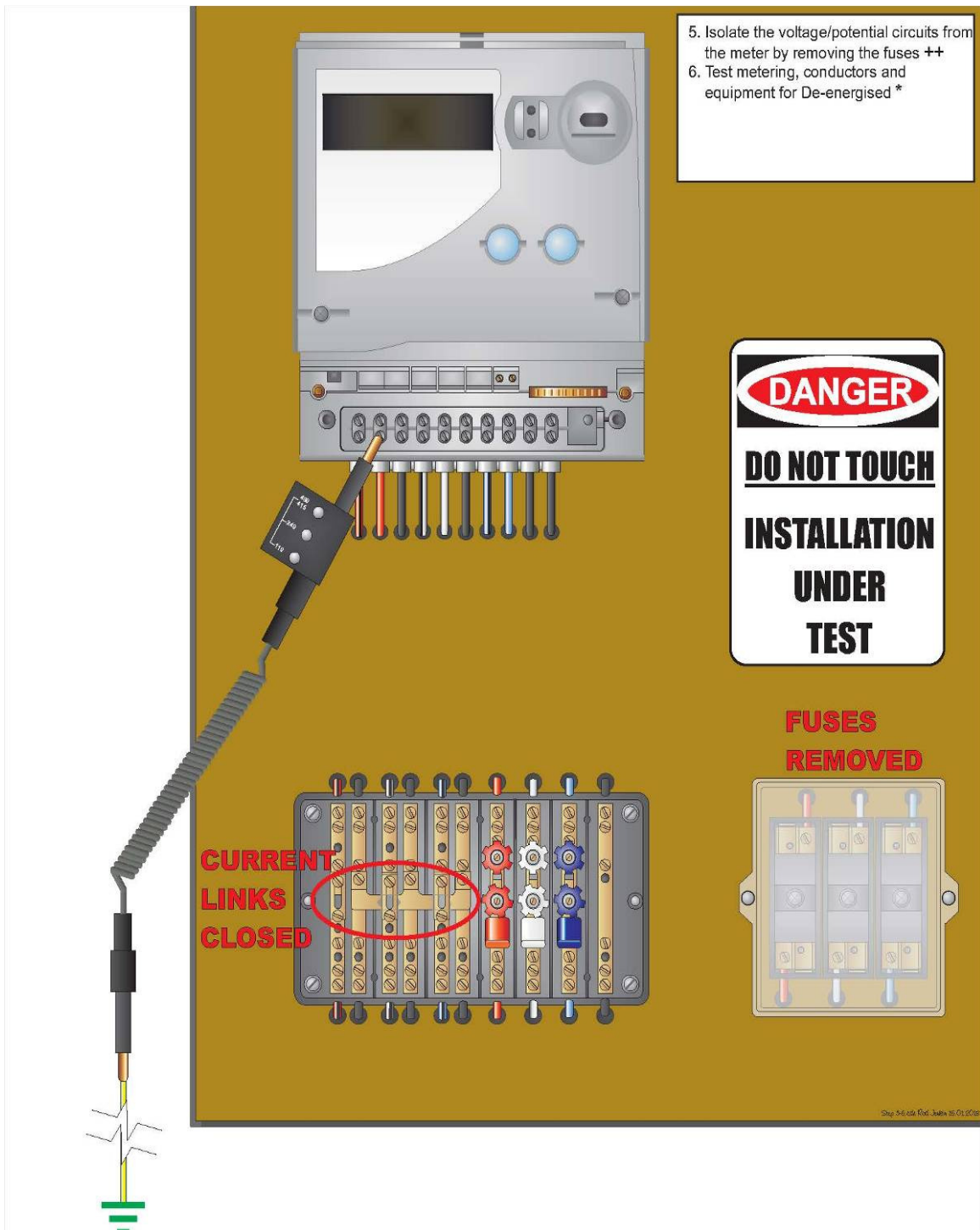


## Alteration and /or Additions - CT metering

*Typical arrangement*

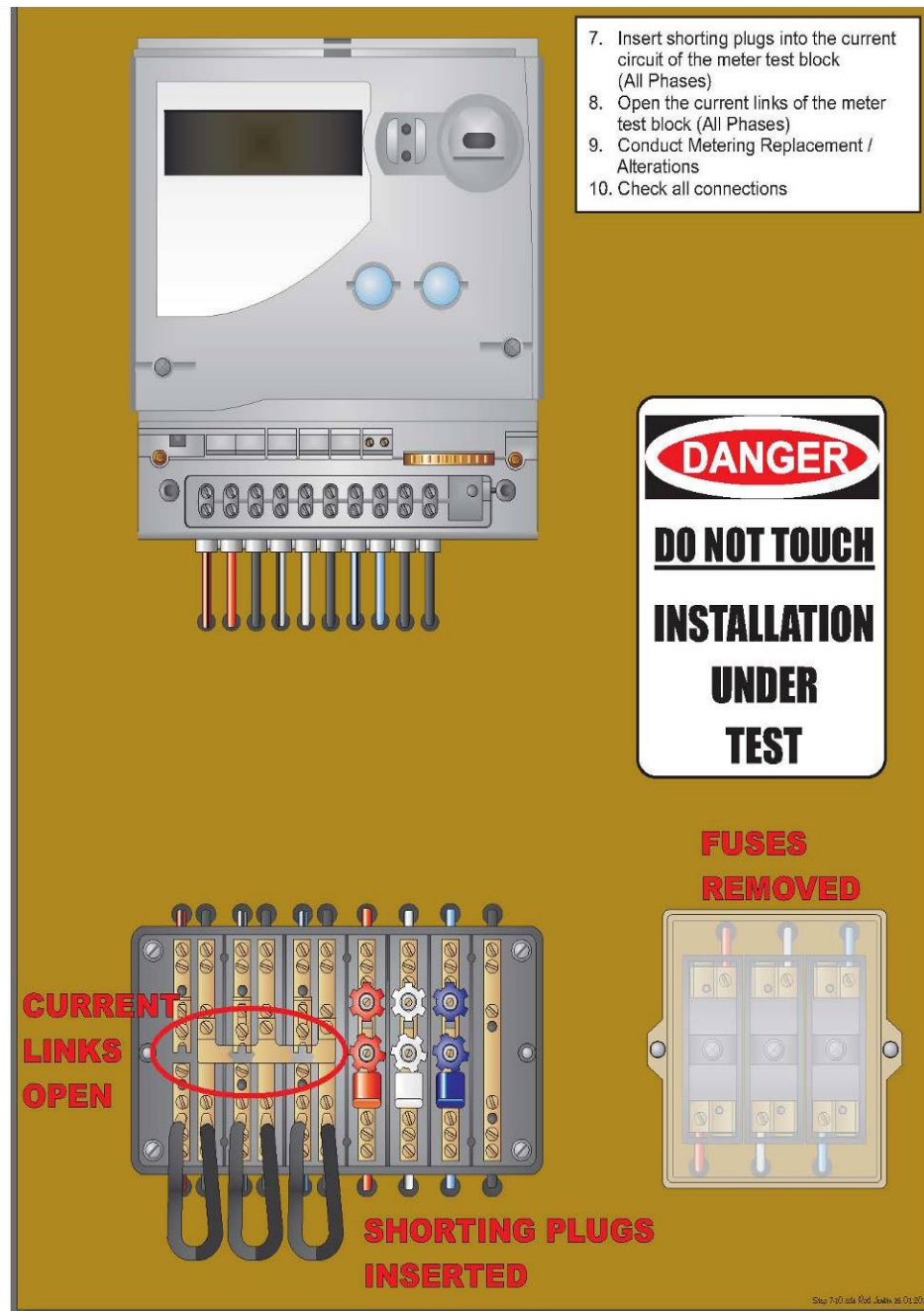


### Alteration and /or Additions - CT metering *Typical arrangement*



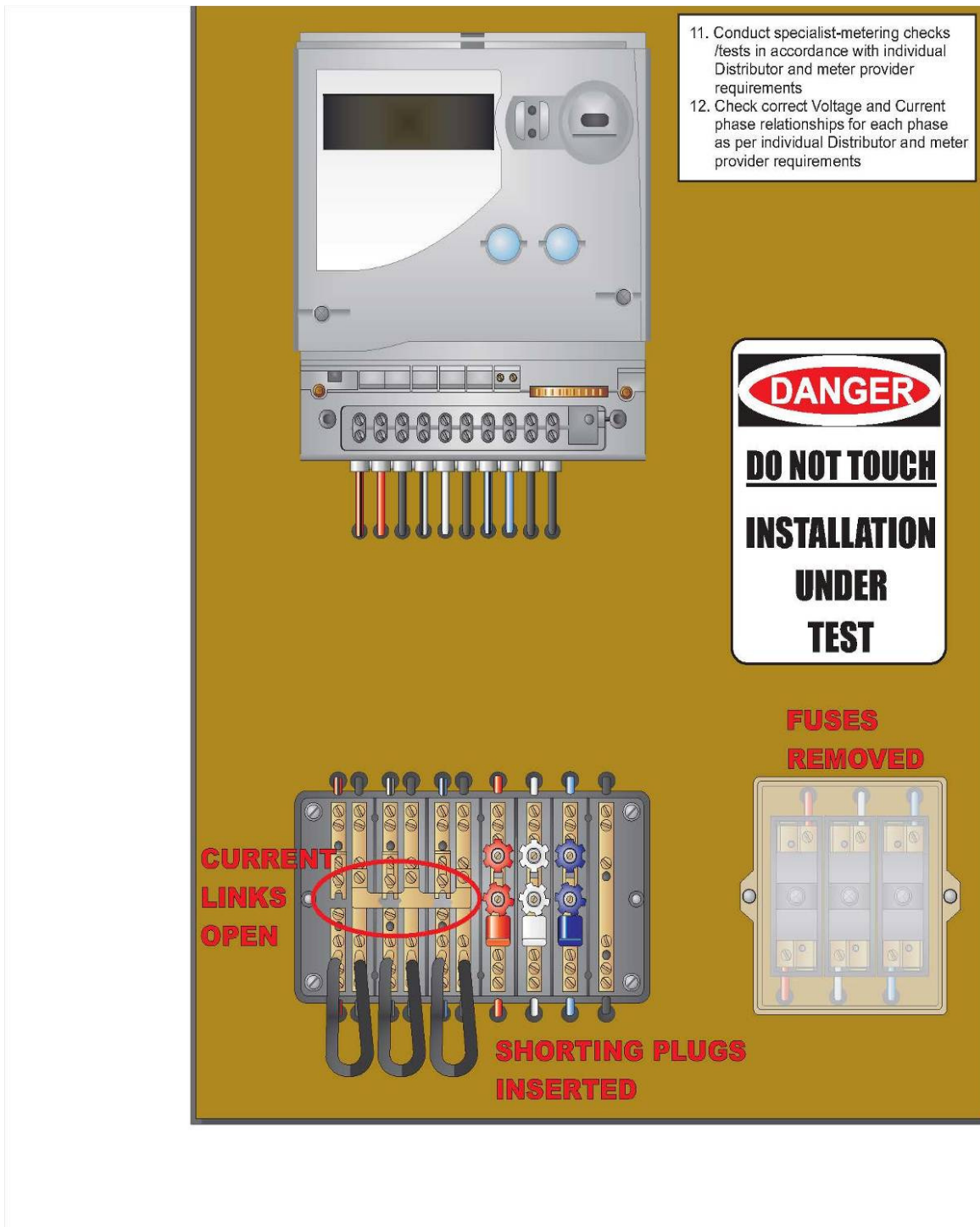
## Alteration and /or Additions - CT metering

*Typical arrangement*



## Alteration and /or Additions - CT metering

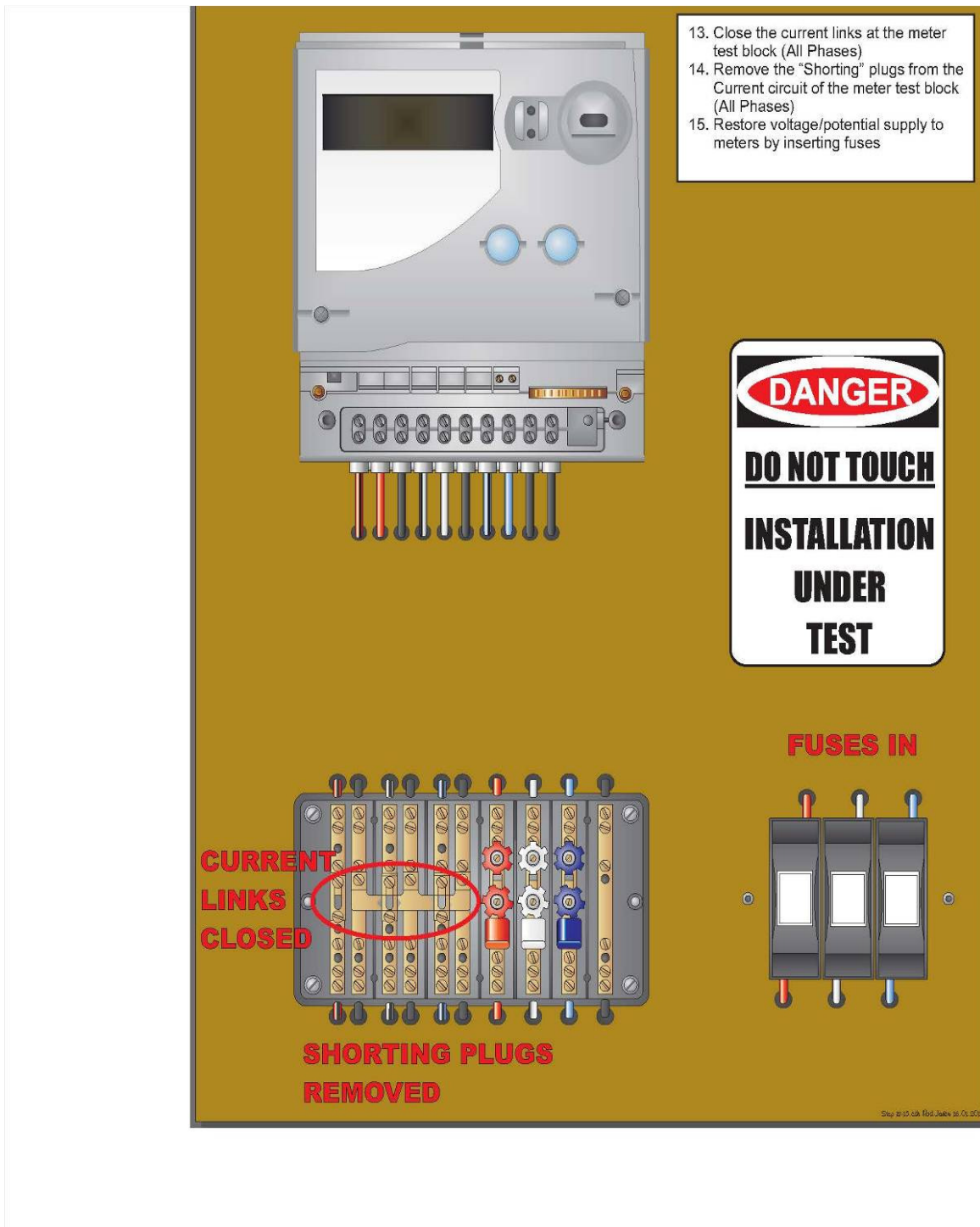
*Typical arrangement*





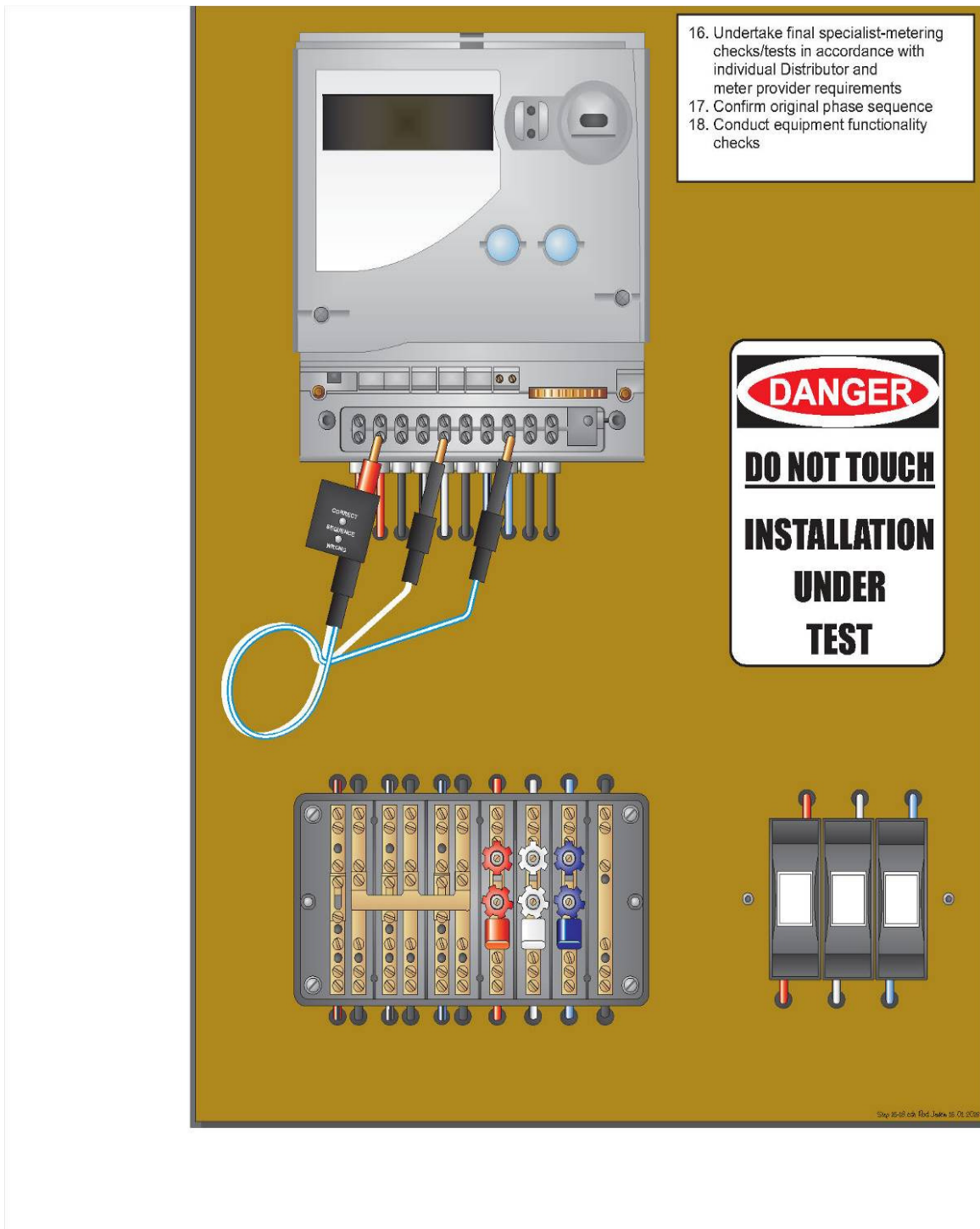
## Alteration and /or Additions - CT metering

*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:

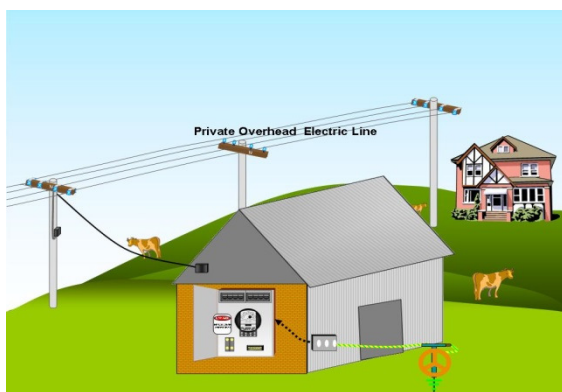
-Should further work be required by customer/REC – Defect notice may need to be issued

\* 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.

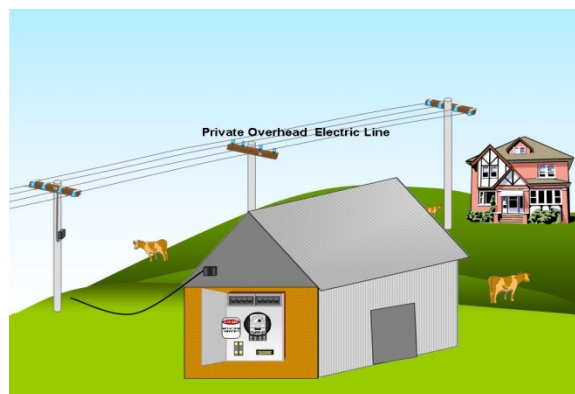


### Supply End

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.

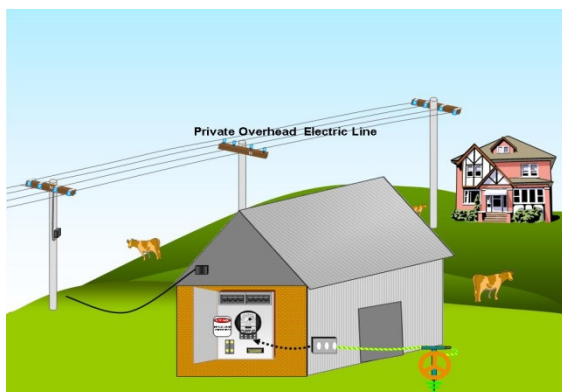
#### **As applicable:**

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



### Installation/Occupancy

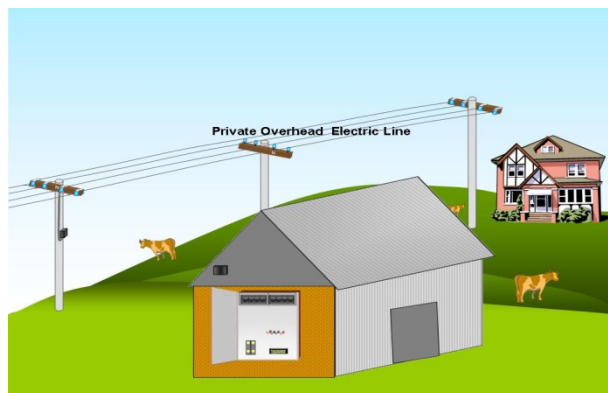
11. Test for de-energised.



### 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.

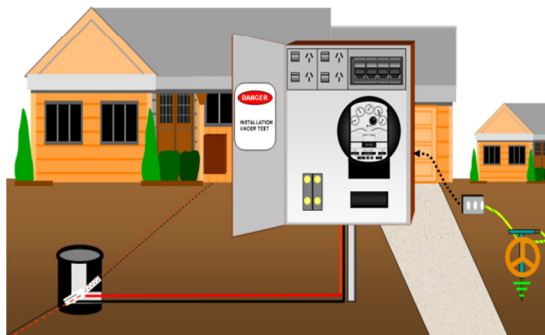
NOTE~ Should further work be required by customer/REC – Defect notice may need to be issued.



## Typical Abolishment - Underground Supply

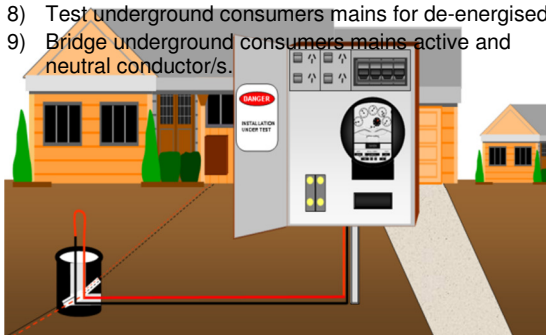
### Preliminary Site Checks

- 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.



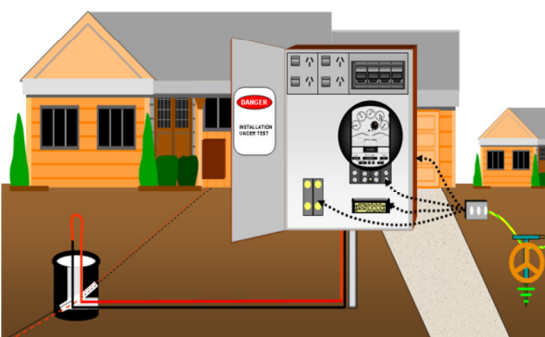
### Supply/Pit End

- 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.



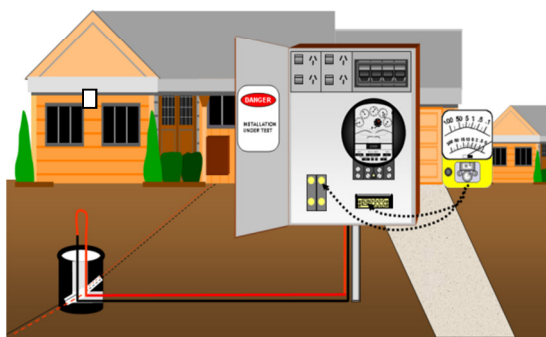
### Installation End

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



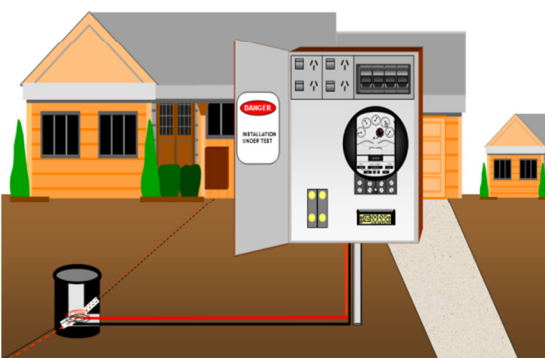
### Installation End

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



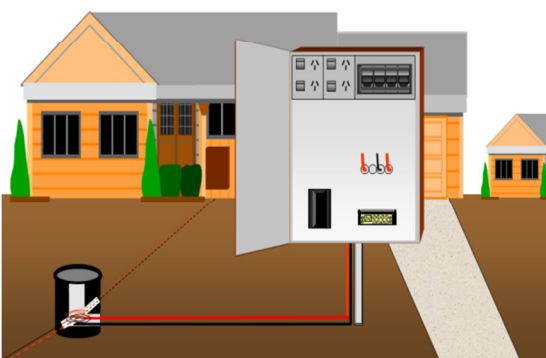
### Supply/Pit End

- 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.