

**SWITCHING, ISOLATING AND EARTHING SECTION 6**

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Should you require further information, please refer to the following manual:

Code of Practice on Electrical Safety for the Distribution Businesses in the Victorian Electricity Supply Industry (The Green Book).

## 1. PERSONS AUTHORISED TO OPERATE ELECTRICAL APPARATUS

1. Switching and associated duties on electrical apparatus should be performed by either Electrical Operators or persons whose training, duties and instructions cover the particular apparatus. However, any person who has the ability may perform operations in the following circumstances:
  - When specifically instructed by, or authorised by the appropriate Operating Authority; or
  - In an emergency involving serious risk to persons or property.
2. All switching shall be directed and controlled by the appropriate Operating Authority.

## 2. SWITCHING - PERSONAL SAFETY

1. When operating electrical apparatus, you shall:
  - Wear approved safety headwear.
  - Wear approved clothing (e.g. overalls).
  - Wear approved and appropriate eye protection.
  - Wear approved insulating sole footwear.
  - Only use devices to open circuits under load that are capable of interrupting the current involved.
  - Avoid contact with any earthed conductive equipment.
2. When operating electrical apparatus via a metal handle (including isolating or restoring rackable metal clad switchgear) you shall always wear appropriate insulated gloves, which are regularly tested and maintained, with one of the following:
  - An insulated platform (e.g. ladder, EWP).
  - A HV mat.
  - Two interleaved LV mats.
  - A HV operating sleeve (appropriately tested and maintained).

3. When operating electrical apparatus via operating sticks, they shall be:
  - Of the appropriate length for the voltage involved.
  - Appropriate for the task involved.
  - Appropriately tested, maintained and within test date.

### 3. SWITCHING - GENERAL

1. When switching electrical apparatus the following shall apply:
  - Switching instructions given over the radio, telephone or in person should be repeated back for confirmation, to prevent errors. Apparatus shall be referred to in sufficient detail to enable positive identification.
  - After operating a piece of equipment, the operator shall confirm the equipment's status.
  - Appropriate tags shall be attached to all switches and/or control circuits operated to de-energise equipment or line sections on which an Access Authority is required.
  - If during the course of switching a piece of electrical apparatus it is found to be defective it shall be reported to the appropriate control centre or authorised individual and an appropriate tag attached.
  - Employees shall not remove or alter in any way, without consulting the operating authority or individual who attached the tag, any tags that have been applied to a device.
2. For the purposes of identification, wherever practicable, electrical apparatus shall be clearly labelled.
3. Before making any apparatus alive, the operating authority shall ensure that:
  - In the case of new apparatus, all necessary clearances have been verified by the operator. This may include certificates for electrical certification for HV customers.
  - Any Access Authorities, or other documents pertaining to the apparatus have been cancelled.

- The results of any pre-activation tests required to be carried out on the apparatus are satisfactory.
  - All earths are removed and a visual inspection shows that to all appearances the apparatus is ready for service.
4. Before any electrical connection is made whereby new electrical apparatus or any electrical apparatus previously out of commission can be made alive, the person in charge of the work shall:
- Notify the Operating Authority of the intention to make such connection.
  - Warn all persons associated with the work, and any others likely to be affected, that no further work on the electrical apparatus is authorised unless they are in receipt of an appropriate Access Authority.
  - Arrange for the connection to be made under an appropriate Access Authority or by approved live working techniques.
5. An Operating Authority shall not consider new or changed electrical apparatus, or electrical apparatus previously out of commission, as being available for service until it has been cleared for service and handed over from the constructing or maintaining authority by written notification or by other appropriate procedure.

#### **4. OUT OF COMMISSION**

1. High voltage electrical apparatus may be declared “Out of Commission,” and access gained thereto once the defined disconnection and other necessary precautions have been provided. The written “Out of Commission” declaration shall include a statement concerning the condition of all relevant auxiliary equipment (e.g. control circuits, secondary fuses and fan supplies).
2. Electrical apparatus that is declared “Out of Commission” may be approached and worked upon without the issue of an Electrical Access Authority.
3. Notwithstanding the fact that the electrical apparatus has been disconnected from all sources of supply, due regard shall be given to the possibility of inadvertent energisation from adjacent electrical apparatus, induction, lightning, static charges, or other means.

## 5. EARTHING

1. When work is to be performed on conductors or equipment that have been alive, all phases of the circuits shall be properly earthed and bonded together or the work shall be performed as energised.
2. When earthing you shall:
  - Use only approved earthing devices applied following a safe to earth confirmation by an authorised person, and placed to ensure the safety of the work party.
  - Inspect earthing devices for damage, broken insulation or fittings, and withdraw from service if necessary.
  - Connect an earthing device to earth before it is applied to the conductors, and it shall be removed from the conductors before it is disconnected from earth.
  - Apply and remove an earth by an approved device whenever practicable. Removal by hand should be in accordance with Green Book requirements.
  - Regard an earthing device as liable to become alive until the circuit earthing is complete.
  - Apply earths wherever practicable between the point of access and all sources of supply and at the site of the work.
  - Ensure persons not involved in the earthing are at least 6 metres away.
3. The first earth on electrical apparatus shall be:
  - Applied by an Operator or a suitably authorised person acting under the direction of an Operator.
  - Deemed to be an Operational Earth.
4. Operational earths shall:
  - Be listed on the appropriate Access Authority.
  - Remain under the control of the Operating Authority.

- Not be removed without the permission of the Operating Authority and all persons affected by their removal.
- May act as an onsite earth.
- Be applied in accordance with the priority earthing system as outlined in the Green Book and point 9.

5. On site earths shall:

- Be applied to maximise personal safety.
- Remain under the control of the workparty unless it is an operational earth utilised as an onsite earth.
- Be applied at the structure where the work is being performed wherever practicable by persons trained to do so.

6. If work is to be performed at more than one location in the line section, the conductor to be worked on shall be earthed at each work location.

7. Additional earths shall be applied as necessary to avoid creating open or unearthed circuits being worked upon.

8. When applying multiple earths to a structure ensure all portable earthing devices connect to a common earthing point.

9. The choice of connection for an earthing device should wherever practicable be made on the basis of the following order of preference:

- a. Permanently installed earthing system at the worksite, including the neutral conductor of a Common Multiple Earthed Neutral (CMEN) System. This is not to be confused with a Multiple Earthed Neutral (MEN) System.
- b. Permanently installed earthing system as close as possible to the worksite (within two kilometres).
- c. Earthing ferrule in a concrete pole at the worksite.
- d. Earthing ferrule in a concrete pole as close as possible to the worksite (within two kilometres).
- e. A permanently installed earthing system or concrete pole earthing ferrule within the isolation area.

- f. The ground rod of an installed pole stay.
- g. A temporarily driven spike.

Options f or g should only be used for the first (operational) earth if options a to e are not available and all the poles in the accessed area are non-conductive.

10. Insulated conductors and supervisory cables shall be:
  - Considered energised at all times unless properly disconnected from all sources of supply, tested and earthed.
  - Proven discharged and earthed before work is performed, otherwise live working techniques shall be employed.
  - In the case of work involving the disconnection of the catenary wire, this work shall not proceed until the catenary wire is earthed by means of a temporary earth attached to both sides of the sectionalising point.
11. Earthing of a cable by spiking shall be carried out in the following manner:
  - The remote ends shall be correctly identified.
  - The person in charge of the work shall personally select the cable to be spiked after careful reference to the appropriate records and use of cable tracers where necessary.
  - An approved cable-spiking gun shall be used by a qualified person trained in its use and the prescribed instructions shall be followed at all times.
  - The Operating Authority shall be contacted immediately prior to, and after the spiking is undertaken.
12. To declare high voltage capacitors safe for the issue of an Access Authority, the neutral as well as the actives shall be earthed and, in addition, each individual capacitor shall be discharged to earth before it is touched.

## 6. ELECTRICAL ACCESS AND AUTHORITIES

1. An appropriate safe access system shall be applied before any work commences on electrical apparatus. No person shall touch the conductors of any electrical apparatus unless:
  - The person is working under an Electrical Access Authority covering that electrical apparatus. The equipment has been isolated from all sources of supply (including interconnected LV and generator sets), and the conductors have been discharged and/or earthed/bonded at the work site, and the Electrical Access Authority is available for reference at the site of the work; or
  - In the case of a rackable circuit breaker or rackable voltage transformer, the electrical apparatus is removed from its rack or cubicle position and placed in a designated maintenance position; or
  - The person is working under the terms of a Sanction for Testing on that electrical apparatus; or
  - That electrical apparatus has been declared “Out of Commission;” or
  - The person is performing live work methods in accordance with organisational procedures.
2. When making an application for an Access Authority, you shall:
  - Be authorised to make the application.
  - Establish that the proposed work has been properly planned and can be performed safely.
  - Correctly identify the apparatus to be covered and its location.
  - Accurately define the work to be performed.
  - Submit all relevant paperwork to the operating authority.
  - Have all switching instructions checked by an approved person.
  - Provide appropriate diagrams showing de-energised sections.



3. Access Authorities to both HV and LV assets on a structure shall be either:
  - Simultaneous HV and LV access arrangements (one authority for both); or
  - Non-simultaneous access arrangements (e.g. separate Access Authority for both HV Access Permit and LV Access Authority).
4. HV Electrical Access Authorities shall be issued and cancelled only by Electrical Operators.
5. LV Electrical Access Authorities shall be issued and cancelled only by appropriately trained persons.
6. An Electrical Access Authority and a Sanction for Testing shall not simultaneously be on issue for the same electrical apparatus.
7. When more than one Access Authority is issued on the same apparatus, or where separate parties are working under the terms of one Access Authority, there shall be co-ordination in planning and performing the work to ensure that the actions of one party do not endanger the safety of others. This co-ordination shall be performed by a nominated co-ordinator (e.g. Operating Authority, Recipient in Charge, etc).
8. A recipient may work alone under the terms of an Access Authority provided there is no chance of inadvertent contact with live apparatus, or barriers and warning notices are in place to prevent the recipient inadvertently infringing safe approach distances.
9. Examples of Access Authorities used are as follows (further information is detailed in the referenced Company Operations Procedures).

## Access authorities

AUTHORITY	PURPOSE
Electrical Access Permit ( <b>EAP</b> )	To allow work, in a dead condition, on electrical apparatus that is capable of being energised.
Permit to Work ( <b>PTW</b> )	Issued to a non-VESI person required to perform work near exposed electrical apparatus.
Statement Of Condition of Apparatus - Plant ( <b>SCAP</b> )	Used when switching operations apparatus controlled by non-VESI authorities or other VESI operating authorities.
Sanction for Test ( <b>SFT</b> )	Issued when electrical testing of electrical apparatus is required.
Statement of Isolation of Customer Low Voltage Supply ( <b>SILV</b> )	Issued to a customer or REC when isolation of a customer's LV supply is carried out by VESI employees.
Verbal Statement of Condition of Apparatus - Plant ( <b>VSCAP</b> )	Used between VESI operating authorities.
Work in the Vicinity of Live HV Apparatus ( <b>VA</b> )	Issued to VESI personnel, (including contractors under the control of VESI personnel, for work near electrical assets in zone and terminal stations.

## 7. ACCESS AUTHORITY RESPONSIBILITIES

### 1. Access Authority Issuer (e.g. Operator) responsibilities:

- At the time of issue, the Issuer shall describe and, where practicable, show the electrical apparatus covered by the Electrical Access Authority and the precautions taken, to the Recipient in Charge and all the initial recipients.
- The Issuer shall also describe or point out the nearest points of supply and adjacent live electrical apparatus.
- Ensure each Access Authority is issued to a Recipient in Charge.
- Ensure that the condition of the apparatus covered by the Access Authority is such that it is safe for the proposed work to be undertaken.
- An issuer of an Electrical Access Authority shall not be the Recipient in Charge, but may sign onto the Electrical Access Authority form as a recipient.
- Exclude any person whom they feel is unsafe from performing work under an Access Authority.
- The Issuer shall complete the appropriate Access Authority in total.

### 2. Access Authority Recipient in Charge responsibilities:

- Ensure that all members of the work party who will approach the electrical apparatus sign onto the Access Authority.
- Ensure that the condition of the apparatus covered by the Access Authority is such that it is safe for the proposed work to be undertaken.
- Satisfy themselves concerning the precautions taken, the location of the points of supply, and the proximity of any adjacent live electrical apparatus, and apply for additional precautions if they are not satisfied.
- Ensure that each member correctly identifies the circuit being worked on before approaching any structure carrying more than one circuit.

- Provide appropriate instruction to allow additional persons to sign onto the Access Authority subsequent to the issue of the Access Authority.
  - Ensure that non–authorised persons are bracketed on with an authorised person and placed under their direct supervision.
  - Ensure that an authorised person supervises only one non-authorised person unless company specific procedures state otherwise.
  - Raise as appropriate any “Clearances” or declarations of “Out of Commission.”
  - Ensure that all recipients who signed onto the Electrical Access Authority form have signed off at completion.
  - Advise the Operating Authority of the condition of the electrical apparatus prior to handing it back to the authority.
  - Before the Access Authority is released, employees are to inspect the work area to ensure that non-essential items and all on site earths have been removed and that the line and equipment components are intact and capable of operating properly.
  - Exclude any person whom they feel unsafe from performing work under an Access Authority.
  - Record the attachment and removal of work party earths on the Access Permit.
- 3. Access Authority Recipient responsibilities:**
- Be authorised to sign onto the Access Authority.
  - Ensure that the condition of the apparatus covered by the Access Authority is such that it is safe for the proposed work to be undertaken.
  - Satisfy themselves concerning the precautions taken, the location of the points of supply, and the proximity of any adjacent live electrical apparatus, and apply for additional precautions if they are not satisfied.
  - Not sign onto the Access Authority if they are not satisfied with the conditions of the Access Authority.

- Following a cessation of work or when temporarily absent, report to the Recipient in Charge to confirm the condition of the electrical apparatus under Electrical Access Authority and the adjacent electrical apparatus.
  - Sign off before the Access Authority is relinquished.
  - Avoid the practice of signing off an Access Authority on behalf of another person.
  - After signing off, regard apparatus as ALIVE.
  - Recommend the exclusion of any person whom they feel is unsafe from performing work under an Access Authority.
4. **Access Authority Non Authorised Recipient responsibilities:**
- Seek approval from the Recipient in Charge prior to gaining access.
  - Ensure that they are constantly supervised by the Recipient whom they are bracketed on with (i.e. their guardian).
  - Sign off prior to their guardian.
  - Satisfy themselves concerning the precautions taken, the location of the points of supply, and the proximity of any adjacent live electrical apparatus, and apply for additional precautions if they are not satisfied.
  - Not sign onto the Access Authority if they are not satisfied with the conditions of the Access Authority.
  - Following a cessation of work or when temporarily absent, report to the Recipient in Charge to confirm the condition of the electrical apparatus under Electrical Access Authority and the adjacent electrical apparatus.
  - After signing off, regard apparatus as ALIVE.
5. **An Access Authority** may be issued to one Authorised Recipient, or a recipient may work alone under the terms of an Electrical Access Authority, only in accordance with organisational procedures.
6. **The conditions specified and the precautions listed** on the Access Authority shall not be changed unless mutually agreed upon by both the Operating Authority and the Recipient in Charge, and then only when a check has been made with the appropriate Operating Authority regarding the requirements of other Access Authorities.

## 8. SANCTION FOR TESTING PROCEDURE

1. A Sanction for Testing shall be issued when, for the purpose of testing, it is necessary to work on electrical apparatus in such a manner that the prescribed procedure relating to an Electrical Access Authority must be waived in order that the electrical apparatus may be made alive at high voltage or at a voltage or current considered hazardous by the applicant from either normal or test sources.
2. A Tester in Charge is an Authorised Tester to whom a Sanction for Testing has been issued and who is in charge of all members of the work party signed onto that Sanction for Testing.
3. A Tester in Charge's duties shall be similar to a Recipient in Charge's duties.
4. The Tester in Charge may have an authorised person placed in their charge only if their duties allow for the safe overseeing of the authorised person.
5. Only one Sanction for Testing shall be on issue for the same electrical apparatus at any time. However, where the testing requires work at remote locations, as well as the nominated main location, a complementary Sanction for Testing covering the same electrical apparatus shall be issued at each remote location.

## 9. BARRIERS AND SIGNS

1. Appropriate barriers shall be used where practical to indicate areas containing live electrical apparatus and the degree of hazard therein. These barriers shall be placed so as to guard against mistaken or inadvertent contact with adjacent or nearby electrical apparatus and must take into account all possible approaches to the worksite.
2. Appropriate signs shall be used where practical to identify apparatus covered by an Access Authority and to identify adjacent live apparatus and related hazards. Where there is an immediate and probable risk of contact with live electrical apparatus, "Danger" signs shall be erected.
3. Further information on use, erection and location of signs and barriers is available in Company Operations Procedures.