Note to users

Victoria’s statutory electrical safety requirements are set out in the Electricity Safety Act 1998 (the ESA) and associated Regulations. This Code of Practice (Code) has been developed by the Electrical Safety Committee (ESC), which has been established under Section 8 of the Energy Safe Victoria Act 2005.

Employers, employees, self-employed persons and all persons conducting a business or undertaking who work, employ or engage persons to work on, or near high voltage electrical apparatus are required to be appropriately trained in accordance with this Code. They should be aware of its requirements and comply with the provisions of the Code that apply to the work that is being carried out.

This Code should be read in conjunction with the ESA and the Regulations made under that Act in particular, the Electricity Safety (Installations) Regulations.

Disclaimer

This publication contains work health and safety information. It may cover some of your obligations under various legislation that is administered by Energy Safe Victoria or WorkSafe Victoria. To ensure that you comply with your legal obligations, you must refer to the appropriate legislation.

The latest laws can be accessed by visiting the Victorian legislation website www.legislation.vic.gov.au

This publication does not represent a comprehensive statement of the law that applies to high voltage electrical installations or work on or near high voltage electrical apparatus and is not a substitute for legal advice. You should seek independent legal advice if you require assistance on the application of the law to your situation.

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This Code was published by Energy Safe Victoria on 13 November 2017.
### Electrical safety committee members at the time of publication

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Further information

Anyone seeking additional information on HV safety should contact:

- employer
- HV assets owner
- railway and tramway operators
- generation, transmission and distribution businesses
- Energy Safe Victoria

For general workplace health and safety advice, contact:

**WorkSafe’s Advisory Service on 1800 136 089**

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Energy Safe Victoria (ESV) is the independent technical regulator responsible for electricity, gas and pipeline safety in Victoria, Australia. Part of ESV’s role is to ensure that high safety standards are maintained in relation to the design, construction, operation and maintenance of electrical installations and electricity supply networks. The Code of Practice on Electrical Safety for Work on or Near High Voltage Electrical Apparatus’ (the Blue Book) is an essential part of that role.

The 2017 Blue Book has been prepared by the Electrical Safety Committee established under Section 8 of the Energy Safe Victoria Act 2005.

The Blue Book is revised and republished every five years to ensure that the safety standards for work on or near high voltage electrical apparatus are fit for purpose, reflect industry best practice and are improved where possible.

The Electricity Safety (Installations) Regulations require owners and operators of high voltage electrical installations and complex electrical installations to comply with the Blue Book.

Owners and operators must ensure that anyone who operates and maintains these installations or works on or near parts of these installations is aware of the provisions of the Blue Book and appropriately trained with respect to its content.

The Blue Book is also a published technical standard that major electricity companies (MEC) and other network operators must meet or exceed as part of their Electricity Safety Management Schemes (ESMS).

ESV recognises that the industry needs time to implement the new requirements of the 2017 Blue Book, to train workers and make them aware of the new requirements. Accordingly, the new requirements of the 2017 version of the Blue Book will take effect from 1 March 2018.

I endorse the 2017 Blue Book and commend the committee members and organisations involved in producing this revision.

Paul Fearon
Director of Energy Safety
8 August 2017
# General safety requirements

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Definitions

For the purpose of this Code of Practice, the following definitions shall apply:

1. **Access authority** means any form of authorisation that allows access to, work on or near, or testing of electrical apparatus.

   Examples used in this Code are:
   - **Electrical access permit** means a form of authorisation that allows access to, and work upon, electrical apparatus
   - **Sanction for testing** means a form of authorisation to allow energisation of electrical apparatus for testing purposes
   - **Permit to work adjacent to network assets** means a document providing written permission to persons, other than employees or contractors of the network operator, to work within safe approach distances or near the network operator’s electrical apparatus.

2. **Alive** see live.

3. **Appliance** means any instrument or device designed for use near or in direct contact with live high voltage conductors.

4. **Approved** means having appropriate organisation endorsement in writing for a specific function.

5. **Authorised person** means a person with technical knowledge or sufficient experience who has been approved, or has the delegated authority to act on behalf of the organisation, to perform the duty concerned.

   Examples used in this Code are:
   - **Authorised applicant** means an approved person who has been assessed as competent against an approved training standard to make applications for specified types of access authorities
   - **Authorised electrical operator** means an approved person who has been assessed as competent against an approved training standard to carry out switching operations on high voltage electrical apparatus
   - **Authorised live—high voltage worker** means an approved person who has been assessed as competent against an approved training standard to carry out particular work on or near exposed, live high voltage conductors
   - **Authorised recipient** means an approved person who has been assessed as competent against an approved training standard to receive an electrical access permit
   - **Authorised tester** means an authorised recipient who has been assessed as competent against an approved training standard, and is approved to receive sanction for testing.
6. **Authority to receive electrical access permits** means a form of authorisation held by an *authorised recipient*.

7. **Authority to receive sanctions for testing** means a form of authorisation held by an *authorised tester*.

8. **Authority to work in the vicinity of electrical apparatus** means a form of authorisation to be used where applicable to allow work in the vicinity of electrical apparatus.

9. **Bonded** means connected together in such a manner as to ensure that all connected parts are maintained at the same potential.

10. **Cable** means an *insulated conductor* or two or more such conductors laid together, whether with or without fillings, reinforcements or protective coverings.

11. **Circuit breaker** means a device capable of making, carrying and breaking currents under normal and abnormal circuit conditions, such as short circuit.

12. **Competent** means having the skills, knowledge and attributes a person needs to complete a task.

13. **Conductor** means a wire or form of metal designed for carrying electric current.

14. **Connected** means joined together by a conductor capable of carrying electrical current for its required function or purpose by either physically clamping or bolting conductors together or closing a circuit breaker, switch or similar device.

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

16. **Discharged** means having been connected to the general mass of earth in such a manner as to remove any residual electrical energy in a conductor.

17. **Earthed** means directly electrically connected to the general mass of earth so as to ensure and maintain the effective dissipation of electrical energy.

18. **Earthing device** means an approved device used for the earthing of conductors.

19. **Electrical apparatus** means any electrical equipment, including overhead lines and underground cables, the conductors of which are live or can be made live.

20. **Energised** means connected to a source of electrical supply.

21. **Equipotential work zone** means a work zone (area, site) where all equipment is interconnected by hoppers, earths, earth rods, and/or earth grids that will provide acceptable potential differences between all parts of the work zone under worst-case conditions of energisation.

22. **Exposed conductor** means an electrical conductor, approach to which is not prevented by a barrier of rigid material or by insulation that is adequate under a relevant Australian Standard specification for the voltage concerned.

23. **High voltage or HV** means a nominal voltage exceeding 1000 volts AC. or exceeding 1500 volts DC.
24. **High voltage electrical apparatus** means electrical apparatus that is required to operate at high voltage. This definition shall not include the secondary wiring of instrument transformers or control devices that may operate on occasions above 1000 volts.

25. **High voltage customer** means any user of electricity (excluding the licensed generators, transmission and distribution companies) directly connected at high voltage to the transmission or distribution networks.

26. **Instructed person** means a person adequately advised or supervised by an authorised person to enable them to avoid the dangers that electricity may create.

27. **Insulated mobile plant** means mobile plant approved and tested for carrying out work on or near electrical apparatus.

28. **Insulated** means separated from adjoining conducting material by a non-conducting substance that provides resistance to the passage of current, or to disruptive discharges through or over the surface of the substance at the operating voltage, and to mitigate the danger of shock or injurious leakage of current.

29. **Insulating stick** means a stick approved and tested for carrying out operating and live work on live electrical apparatus.

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

31. **Live** means energised or subject to hazardous induced or capacitive voltages.

32. **Live work** means all work performed on components of electrical apparatus not isolated, proved de-energised and earthed.

33. **Low voltage or LV** means nominal voltage exceeding 50V AC or 120V DC but not exceeding 1000V AC or 1500V DC.

34. **Mobile plant** means cranes, elevating work platforms, tip trucks or similar plant, any equipment fitted with a jib or boom and any device capable of raising or lowering a load. Mobile plant can only be considered as a vehicle when in the normal travelling mode and not in the working mode when determining safe approach distances.

Helicopters used for barehand live-line work are excluded from this definition of mobile plant.

35. **Near** means a situation where there is a reasonable possibility of a person, either directly or through any conducting medium, coming within the relevant safe approach distances.
36. **Network asset** means any asset that is owned or operated by a network operator for the purposes of generating, transmitting, distributing or supplying electricity.

37. **Network operator** means the owner, controller or operator of an electricity network.

38. **Nominal voltage** means the AC (phase to phase RMS) or DC voltage by which a system of supply is designated.

39. **Not electrically connected** means dis-connected from all sources of supply by the removal or absence of conductors, appropriate to the voltage and insulating medium and not able to be made live by normal operating means and identified in accordance with approved procedures.

40. **Operating Authority** means an organisation or an authorised person who is responsible for operational control of the electrical apparatus concerned.

41. **Ordinary person** means a person without sufficient training or experience to enable them to avoid the dangers that electrical apparatus may create.  
   **Note:** Ordinary person in this Code refers to a person under the control of a network operator, generator or HV customer.

42. **Organisation** means a business, enterprise, company or corporation.

43. **Out of commission** means the condition of electrical apparatus that is not electrically connected and declared to be so in writing to the operating authority responsible for the electrical apparatus.

44. **Personal protective equipment** means clothing, equipment and/or substances which when worn or correctly used, protect parts or all of the body from foreseeable risk of injury or disease at work or in the workplace.

45. **Practicable** see reasonably practicable.

46. **Procedure** means the documentation of a systematic series of actions (or activities) directed to achieve a desired result.

47. **Reasonably practicable** means having regard to:
   a) the likelihood of the hazard or risk concerned eventuating
   b) the degree of harm that would result if the hazard or risk eventuated
   c) what the person concerned knows, or ought reasonably know, about the hazard or risk and any ways of eliminating or reducing the hazard or risk
   d) the availability and suitability of ways to eliminate or reduce the hazard or risk; and
   e) the cost of eliminating or reducing the hazard or risk.

48. **Recipient** means a person who has signed on an access authority.

49. **Recipient in charge** means an authorised recipient to whom an access authority has been issued and who is in charge of all recipients signed on that access authority.

50. **Resumption of (resume) an access authority** means the re-commencement of all work under an access authority that had been suspended.
51. **Safe approach distance** means the minimum distance in air from exposed conductors that shall be maintained by a person, vehicle or mobile plant (including its load, controlling ropes and any other accessories) when approaching electrical apparatus other than for work in accordance with an access authority.

52. **Safety observer** means a person with sufficient knowledge of the task being performed and competent for the duty of observing and warning against unsafe approach to electrical apparatus.

53. **Shall** is to be interpreted as mandatory.

54. **Should** is to be interpreted as advisory or discretionary.

55. **Station** means a defined and enclosed or fenced space in which high voltage supply is generated, converted, controlled or transformed.

56. **Suspension of an access authority** means the cessation of all work under an issued access authority where all persons working under that authority have signed off.

57. **Tester in charge** means 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 on that sanction for testing.

58. **Vehicle** means a truck, car, utility or other general purpose conveyance used for the carriage of persons or goods (see also mobile plant).

59. **Vicinity** means a situation where it is unlikely that a person will, either directly or through any conducting medium (e.g. via mobile plant), come within the relevant safe approach distances.

60. **Written** (in writing) means recorded on paper or in electronic form.
Workplace health and safety laws place duties on businesses and workers to ensure, so far as is reasonably practicable, the health and safety of workers and that of other persons is not put at risk from the work.

The purpose of this Code is to provide practical guidance in maintaining safe systems of work in relation to control of risks associated with work on or near, or in the vicinity of, high voltage electrical apparatus in Victoria.
This Code of Practice defines:

a) principles; and

b) minimum electrical safety requirements.

This Code shall apply to all work on, near or in the vicinity of:

- high voltage electrical apparatus that is capable of being energized, and/or
- low voltage electrical apparatus that is capable of being energized and is a component of:
  - an electricity supply network operated or controlled by a major electricity company, or
  - an electricity supply network operated or controlled by an owner or operator of a railway.

This Code sets minimum requirements that should be enhanced by approved procedures. These approved procedures may utilise other published standards and guidelines to enhance the level of safety.

In order to comply with the electrical safety requirements of this Code, an organisation shall either:

a) apply the requirements contained within this Code; or

b) vary the requirements by:

- completing a hazard identification and risk assessment; and
- ensuring the electrical safety outcomes are equal to or better; and
- documenting the process; and
- advising ESV in writing of outcomes and reasons for variation(s) prior to implementing the variation.

Figure 1: Hierarchy of documentation for electrical safety

Acts and Regulations

Codes and safety rules

Organisation procedures

Work instructions
3 General safety requirements

Principle
An organisation **shall** have procedures relevant to providing a comprehensive safe working environment.

3.1 Hazard identification, risk assessment and control
An organisation’s safe system of work **shall** include appropriate risk management processes to ensure hazards associated with work within safe approach distances or near electrical apparatus are identified, assessed and controlled.

Prior to working on or near any electrical apparatus, the persons performing the work **shall** apply the safe system of work to identify, assess and control the associated hazards and risks.

The hazard identification and risk assessment process **shall** be regularly reviewed and audited to ensure compliance.

3.2 First aid
Persons who are required to work where there is a risk of injury from live electrical conductors **shall** be given appropriate training on commencement and thereafter subject to annual competency assessment.

Training **shall** cover skills in cardio-pulmonary resuscitation, shock, burns and their role in incident assessment and management in accordance with relevant National Competency Standard Units.

3.3 Communications
All communications relating to the operation of, or access to, electrical apparatus **shall** be clear and definite. Electrical apparatus **shall** be referred to by name and sufficient detail to give positive identification. Verbal instructions and statements issued over phones or radios **shall** be confirmed by repeating back to avoid misunderstanding.

3.4 Forms
As a minimum, forms **shall** contain minimum information as prescribed in Appendix A.

3.5 Use and testing of operating and live-line equipment
All sticks, gloves, sleeves, mats, protective barriers or covers, earthing trucks, portable earthing devices, insulating platforms, insulated elevating work platforms or other equipment used for operating high voltage electrical apparatus or performing live-line work **shall** be approved for the particular application.

All equipment including protective equipment used on high voltage electrical apparatus and that requires regular testing to prove the effectiveness of insulation **shall** be tested at intervals as specified in approved procedures and marked to show the date of the next routine test. Equipment **shall** not be used after the marked test date.

Visual inspection **shall** be made for physical damage or contamination immediately prior to use.
Gloves, sleeves, mats and protective barriers or covers used for operating high voltage electrical apparatus or for performing live high voltage work shall not be relied upon as the sole means of protection.

3.6 Insulating sticks

*Insulating sticks shall* have a length that provides appropriate insulation from live parts and enables a person using the stick to maintain the applicable *safe approach distance* at all times. (Refer to 6.2)

When an *insulating stick* is to be used in wet conditions consideration shall be given to the potential for hazardous surface leakage currents.

3.7 Labelling of electrical apparatus

For the purposes of identification and description, *electrical apparatus shall*, wherever practicable, be clearly labelled.

3.8 Ladders

Conductive ladders (including wire reinforced) shall not be used on, near or in the vicinity of, exposed *live electrical apparatus*, unless in accordance with approved procedures.

3.9 Personal protective equipment

All persons who may be exposed to possible electric shock, arc flash or other injury from *electrical apparatus shall* use approved personal protective equipment. *Personal protective equipment shall* include clothing with wrist to ankle cover and fully enclosed footwear.

Additional *personal protective equipment shall* be used in accordance with the type of work and the risks involved.

All protective equipment and apparel shall comply with relevant published standards.

**General PPE requirements**

1. **Working on, near or in the vicinity of electrical apparatus approved safety:**
   - headwear; and
   - natural fibre or alternative arc flash protective clothing; and
   - footwear.

2. **Operating electrical apparatus approved safety:**
   - headwear; and
   - footwear; and
   - natural fibre or alternative arc flash protective clothing; and
   - hand protection; and
   - face/eye protection.

3. The person responsible for supervising visitors whose movements are confined to normal access ways, (e.g. roads, paths, and stairs) in a station, shall ensure that the visitors shall utilise the following approved items:
   - safety headwear; and
   - fully enclosed footwear; and
   - ankle to wrist clothing.
3.10 Tapes and other measuring devices

Only approved non-conducting tapes and rulers shall be used in the vicinity of live electrical apparatus. Conductive tapes shall not be used near exposed live electrical apparatus unless approved for use in accordance with approved procedures.

3.11 Use of safety observers

A safety observer shall be posted where, after a risk assessment, it is considered that a person, equipment or mobile plant might inadvertently infringe safe approach distances.

Under no circumstances shall the safety observer be diverted to other work while the possibility of infringing the safe approach distances exists.

A person acting as a safety observer shall:

a) understand the task, work process and sequence of work; and

b) have the authority to temporarily suspend the relevant work at any time; and

c) be specifically instructed in the duties and workplace hazards applicable; and

d) be positioned to effectively observe and immediately communicate with persons performing the work; and

e) monitor the work and warn against potential infringement of safe approach distances; and

f) be capable of providing assistance in the case of emergency as well as being competent to perform electrical rescue and cardiopulmonary resuscitation, as required.

3.12 Fit state for work

Alcohol, drugs and diminished mental alertness or physical condition of a person may impede their ability to work safely in an electrical environment.

Persons who are required to work on, near or in the vicinity of electrical apparatus shall not consume or be under the influence of alcohol or drugs that diminish work skills during work hours. This shall be taken to include meal or rest breaks.

Appropriate policies shall be implemented by organisations.
3.13 Work within electric and magnetic fields

3.13.1 General

Persons working within electric and magnetic fields (EMF) shall be appropriately protected from the annoyance, due to electric discharge effects of strong electric fields and the possible biological effects associated with extremely strong electric and magnetic fields.

Persons using implantable medical devices, including cardiac pacemakers, should consult their doctors and the relevant organisational officer for information on possible electromagnetic interference with the medical devices prior to entering areas of strong electric and magnetic fields.

Advisory occupational exposure limits provided in National Health and Medical Research Council (NHMRC) Interim Guidelines are listed in the following sections.

Organisations should establish appropriate exposure limits in accordance with industry guidelines e.g. Energy Network Australia EMF Management Handbook.

3.13.2 Electric fields (50 Hz)

Advisory occupational exposure limits for electric fields based on the NHMRC interim guidelines are as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrestricted</td>
<td>Less than 10 kV/m</td>
</tr>
<tr>
<td>Short term</td>
<td>10 kV/m to 30 kV/m</td>
</tr>
<tr>
<td>Alternative</td>
<td>Greater than 30 kV/m</td>
</tr>
</tbody>
</table>

- No time limits apply for exposures below 10 kV/m.
- Short-term exposure to fields from 10 kV/m to 30 kV/m is permitted provided the field strength (in kV/m) multiplied by the duration of exposure (in hours) does not exceed 80 for the whole day. For example, exposure to an electric field of 20 kV/m would be permitted for four hours.
- For work situations with field strengths greater than 30 kV/m, alternative controls shall be used. Such controls may include wearing appropriately earthed or bonded conducting suits, the screening and earthing of vehicles, the screening of work platforms and access ways, and de-energising adjacent electrical apparatus.

The person responsible for planning the work shall include in the work instructions details of any appropriate measures to be taken.
3.13.3 Magnetic fields

The NHMRC’s guidelines for limits of occupational exposure to magnetic fields are as follows:

**a) Magnetic fields (50 Hz)**

<table>
<thead>
<tr>
<th>Exposure Type</th>
<th>Limit (milliTesla)</th>
<th>Limit (milliGauss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole working day</td>
<td>0.5</td>
<td>(5000)</td>
</tr>
<tr>
<td>Short term (two hours per day)</td>
<td>5</td>
<td>(50,000)</td>
</tr>
<tr>
<td>Limit for limbs (e.g. extended arm)</td>
<td>25</td>
<td>(250,000)</td>
</tr>
</tbody>
</table>

**b) Static or direct current (DC) magnetic fields**

The 2009 International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines for limits a, b, c, (see notes below) of occupational exposure to static or DC magnetic fields are as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Limit (milliTesla)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head and trunk</td>
<td>2000</td>
</tr>
<tr>
<td>Limbs</td>
<td>8000</td>
</tr>
</tbody>
</table>

**Notes:**

a) **Caution:** because of potential indirect adverse effects, ICNIRP recognises that practical policies need to be implemented to prevent inadvertent harmful exposure of persons with implanted electronic medical devices and implants containing ferromagnetic material. This requirement may lead to much lower restriction levels such as 0.5 milliTesla.

b) For specific work applications, exposure up to 8000 milliTesla can be justified, if the environment is controlled and appropriate work practices are implemented to control movement-induced effects.

c) When magnetic flux densities exceed 5 milliTesla (static or DC magnetic fields) precautions should be taken to prevent hazards from flying metallic objects.

3.14 Victim Rescue

Persons shall be trained in victim rescue techniques appropriate to the job function being performed.

Before performing victim rescue on or near live exposed conductors, the rescuer shall consider all hazards and methods to control the hazards to ensure the rescue can be performed safely. Such controls may include de-energisation of the circuit, the use of insulated sticks and maintaining SAD during the rescue.

Victim rescue assessment and/or instruction shall be undertaken by relevant personnel in accordance with appropriate National Competency Standard Units.
**Principle**
Persons working on or near electrical apparatus shall have appropriate training, authorisation and currency of competency for the duty to be performed.

### 4.1 General

An organisation’s safe system of work shall include appropriate training, competency and authorisations for all persons working on or near electrical apparatus.

A person’s authorisation shall be current for the task being performed.

Competency of persons holding authorisations shall be assessed at no more than a nominal three-yearly interval and training shall be given to restore competency where appropriate.

A person may perform a task that normally requires authorisation or approval without that authorisation or approval (e.g. HV operating), only when that task is performed under a training program and the person is effectively supervised.

### 4.2 Approved training standard

#### 4.2.1 Introduction

Training shall consist of identified learning outcomes that will be knowledge, skill (task), and attitude based and, where appropriate, reflect National Competency Standards.

- There shall be assessment criteria established and documented for each learning outcome.
- Details of assessment method shall be documented.
- There shall be a documented process for recognition of prior learning.
- Persons undergoing training must be assessed for competency against learning outcomes, and such assessment must be documented.
4.2.2 Learning outcomes
Learning outcomes shall include, but not be limited to, the following:

- working knowledge of the relevant sections of this Code;
- knowledge of communication processes required;
- knowledge of the relevant approved procedures;
- a knowledge of the consequences of any physical tasks performed;
- a working knowledge and skill associated with the relevant:
  - forms and documentation; and
  - risk assessment; and
  - work practices; and
  - equipment and plant
- demonstration of acquired knowledge through practical exercises;
- a clear understanding of the responsibilities associated with relevant authorisations e.g. the range of responsibilities associated with a recipient in charge; and
- other training requirements as specified herein.

4.2.3 Training courses
Organisations shall confirm that training courses and the service providers meet their recognised needs. Where appropriate training shall be consistent with National Competency Standards.

4.2.4 Records
Organisations shall develop and maintain an appropriate management system for recording of all training and authorisations.
5 Work in the vicinity of electrical apparatus

Principle
Work in the vicinity of electrical apparatus shall be carried out in a safe manner. Control measures taken shall be consistent with the risk and work performed.

5.1 General
For all works in the vicinity of electrical apparatus, either specific written work instructions shall be used or alternatively approved procedures shall apply in conjunction with the use of instructed or authorised persons.

Where the risk assessment requires a record of the control measures, then instructions shall be issued to the work party in accordance with approved procedures.

The control measures implemented shall minimise the risks involved and may include:

a) defining the work area;
b) defining access routes;
c) isolating and earthing the electrical apparatus;
d) the use of barriers and signs;
e) the use of approved covering;
f) the use of safety observers; and
g) the issue of the appropriate access authority or authority to work in the vicinity of electrical apparatus.

5.2 Use of mobile plant

Mobile plant shall only be used in the vicinity of live conductors and/or electrical apparatus after precautions appropriate to the particular circumstances have been considered and action taken to control the associated hazards and risks.

The control measures to be considered within a risk assessment should include:

a) isolating and earthing electrical apparatus;
b) positioning the mobile plant such that the safe approach distance can be maintained in all circumstances;
c) the use of safety observers and barriers and signs;
d) the use of other precautions such as physical restrictions or control devices in conjunction with barriers;
e) the suppression of auto-reclose;
f) the alteration of protection and control settings;
g) de-energising the electrical apparatus;
h) mechanical limitation devices options on mobile plant.

Mobile plant and vehicles, where appropriate shall be fitted with a trailing earthing conductor to protect against the hazards presented by induced voltages.

When mobile plant may come near live electrical apparatus (refer to section 6), the mobile plant shall be earthed. This shall be achieved by an approved earthing system.
When mobile plant is operated from outside the mobile plant, precautions shall be taken to protect the operator from hazardous step and touch potentials. No person other than the mobile plant operator shall touch the mobile plant while in operation.

Where mobile plant (e.g. EWP) is not fully insulated, the insulation level of each part shall be labelled in accordance with the appropriate standard (e.g. AS1418.10) and the following permanent sign shall be fixed at all plant operator’s control.

**DANGER—BEWARE OF POWER LINES**
This appliance is not fully insulated. Do not permit any uninsulated part of this appliance to be in close proximity to live conductors.

Insulated mobile plant shall be tested at specific intervals as per approved procedures and marked to show the date of the next routine test.

### 5.3 Handling objects/loads

When objects are being handled manually or by mechanical equipment, care shall be exercised to prevent the objects or the mechanical equipment infringing safe approach distances.

For mechanical handling where there is a risk of infringing the safe approach distances to electrical conductors, the movement of loads shall be controlled by means of approved non-conducting ropes or other approved means. (Refer to section 6)

No person shall contact the load or any attached conducting objects until the risk of SAD infringement is removed. Only the plant operator shall contact the mobile plant controls in accordance with safe work procedures. (Refer to section 5.2)

### 5.4 Erection or dismantling of overhead conductors

When overhead conductors (other than insulated or covered conductors) are being erected, dismantled, or replaced, conductors that are being moved shall be earthed by an approved device before work is commenced and shall remain earthed until the work is completed. A conductor that is erected shall be earthed before it is lifted from the ground.

Consideration shall be given to the use of appropriate restraining devices to control such conductors when they are being moved.
When earthing is considered to be impracticable or a safer control measure may be appropriate, alternative safety precautions shall be applied and subject to the following controls.

a) They are applied to a specific task or process which has been subject to a formal risk assessment carried out in advance of the work, using a consultative process with subject matter experts.

b) They are documented as an approved procedure specific to the task or process.

5.5 Work by ordinary persons

Where ordinary persons are required to work in the vicinity of electrical apparatus, the ordinary person performing the work, the person in charge of the work and the person in charge of the electrical apparatus shall all cooperate to ensure that the work is performed safely, and that specific precautions are taken.

5.6 Work within stations or on multi-circuit overhead lines with multiple asset ownership

For work within stations or on multi-circuit overhead lines where electrical apparatus is owned by more than one organisation and work is adjacent to another organisation’s exposed electrical apparatus, there shall be joint consideration and agreement reached to carry out the work in a safe manner.

(See also 6.9, 6.10 and 9.2.3)
6 Approach to electrical apparatus

**Principle**

Persons *shall* observe appropriate *safe approach distances* when working, or operating vehicles or *mobile*, on or near *electrical apparatus*.

**6.1 General**

The *safe approach distances* are based on an exclusion zone principle.

This principle defines an area around an *exposed conductor* into which no part of the person, *mobile plant* or object (other than *approved insulated objects*) *shall* encroach, unless in accordance with section 9.

Work practices *shall* be established to ensure persons, *mobile plant* and unapproved objects do not encroach on the *safe approach distances*; these *shall* include consideration of:

- working beyond reach of the exclusion zone *wherever practicable*; and
- precautions to be applied when use of controlled movement is necessary; and
- the work space required including the expected reach of persons performing the work; and
- the movement of *mobile plant* used for the work.

Expected reach *shall* include all intentional and expected movements such as adopting a work position, adjusting a hard hat, manoeuvring tools, and reaching for items being passed to the employee.

Unnecessary approach to *electrical apparatus* or unnecessary contact with parts not regarded as *live* shall be avoided.

Necessary approach to *electrical apparatus* *shall* be kept to a minimum and *shall* be restricted to the period required to perform the work.
SAD is based on the exclusion zone principle and is measured out from the energised conductor. Proper application requires consideration of the work space necessary and either working beyond reach or the use of controlled movements to stay outside the SAD. (For illustration purpose only).
Conductor means a wire, cable or form of metal designed for carrying electrical current.

Vicinity means a situation where it is unlikely that a person will, either directly or through any conducting medium (e.g. via mobile plant), come within the relevant safe approach distances.

Near means a situation where there is a reasonable possibility of a person, either directly or through any conducting medium (e.g. via mobile plant) coming within the relevant safe approach distances.

Safe approach distance means the minimum distance in air from exposed conductors that shall be maintained by a person, vehicle or mobile plant (including its load, controlling ropes and any other accessories) when approaching electrical apparatus other than for work in accordance with an access authority.

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

Figure 3: Illustration of differences between safe approach distance, near and vicinity
6.2 Safe approach distance—persons

6.2.1 Safe approach distance—normal

The safe approach distances for persons performing general work are as shown in Table 1.

Instructed persons’ safe approach distances apply while undertaking duties under supervision or as instructed by an authorised person.

There are elements of electrical apparatus that have semi conductive insulation. Such apparatus shall be treated the same as live apparatus in consideration of safe approach distances. Organisational specific procedures shall be in place to enable activities to be safely performed on semi conductive insulated apparatus.
### Table 1: Safe approach distance for persons to exposed conductors

<table>
<thead>
<tr>
<th>Nominal phase to phase AC Voltage (kV)</th>
<th>Ordinary persons (Note 1)</th>
<th>Instructed persons or authorised persons (Notes 2 and 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV aerial lines</td>
<td>1500</td>
<td>Instructed persons—no contact Authorised persons—insulated contact only</td>
</tr>
<tr>
<td>6.6</td>
<td>2000</td>
<td>700</td>
</tr>
<tr>
<td>11</td>
<td>2000</td>
<td>700</td>
</tr>
<tr>
<td>22</td>
<td>2000</td>
<td>700</td>
</tr>
<tr>
<td>33</td>
<td>2000</td>
<td>700</td>
</tr>
<tr>
<td>50</td>
<td>2000</td>
<td>750</td>
</tr>
<tr>
<td>66</td>
<td>2000</td>
<td>900</td>
</tr>
<tr>
<td>110</td>
<td>3000</td>
<td>1000</td>
</tr>
<tr>
<td>132</td>
<td>3000</td>
<td>1200</td>
</tr>
<tr>
<td>220</td>
<td>4000</td>
<td>1700</td>
</tr>
<tr>
<td>275</td>
<td>5000</td>
<td>2300</td>
</tr>
<tr>
<td>330</td>
<td>6000</td>
<td>2700</td>
</tr>
<tr>
<td>400</td>
<td>6000</td>
<td>3300</td>
</tr>
<tr>
<td>500</td>
<td>6000</td>
<td>3600</td>
</tr>
</tbody>
</table>

**Nominal pole to earth DC Voltage (kV)**

<table>
<thead>
<tr>
<th>LV DC aerial line (equal to or less than 1.5 kV)</th>
<th>Instructed persons—no contact Authorised persons—insulated contact only</th>
</tr>
</thead>
<tbody>
<tr>
<td>±25</td>
<td>2000 700</td>
</tr>
<tr>
<td>±85</td>
<td>3000 1000</td>
</tr>
<tr>
<td>±150</td>
<td>3000 1200</td>
</tr>
<tr>
<td>±270</td>
<td>4500 1800</td>
</tr>
<tr>
<td>±350</td>
<td>5000 2500</td>
</tr>
<tr>
<td>±400</td>
<td>6000 2900</td>
</tr>
</tbody>
</table>

### Notes:

1. See definition for ordinary person. Persons not under control of the asset owner (network operator or HV customer) shall refer to the WorkSafe / ESV No Go Zone Rules and Section 12 of the Code.
2. Deliberately avoid movements that could result in distances being infringed.
3. These distances specified are based on work from a stable surface. Appropriate allowance shall be made for conductor sag and sway.
6.2.2 Safe approach distance—special

Safe approach distance—special is the minimum distance to an exposed conductor from any outstretched part of a person’s body or any conducting or unapproved object touching any part of the person’s body.

Safe approach distance—special shown in Table 2, has been determined using risk analysis methodology and consideration of power frequency and switching surge distances, plus a reduced provision for inadvertent movement.

Safe approach distance—special, shall be used only by authorised persons performing approved tasks, after consideration of SAD normal, access permit, and live-line methods.

These safe approach distances shall be used only in conjunction with the following control measures:

a) approved safe work practice to ensure no part of the person’s body or any conducting or unapproved object touching any part of the person’s body infringing the relevant safe approach distances—special; and

b) positioning of the worker to minimise the risk of the specified distance being infringed. This includes any unapproved object or tool being held by the worker; and

c) using a person specifically trained and authorised to perform the work at the safe approach distance—special; and

d) work crew on-site risk assessments are conducted; and

e) safety observers are used to monitor the work activities; and

f) minimise the exposure at the safe approach distance—special; and

g) addressing adverse impact of external influences on plant and equipment, e.g. traffic, boom movement, footing; and

h) addressing adverse impact of weather and environmental conditions e.g. rain, lightning, wind, light, sag or sway of conductors.

The work party shall consider the suppression of the auto reclose function as part of the pre-work planning.

If these controls are not achieved, either an access authority shall be issued or live work techniques shall be applied, or alternative safe approach distances—special and procedures shall be developed in accordance with section 6.2.3.

Table 2: Safe approach distance—special for authorised persons only to exposed conductors

<table>
<thead>
<tr>
<th>Nominal phase to phase AC voltage (kV)</th>
<th>Authorised persons (millimetres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV Insulated contact only</td>
<td></td>
</tr>
<tr>
<td>6.6</td>
<td>450</td>
</tr>
<tr>
<td>11</td>
<td>450</td>
</tr>
<tr>
<td>22</td>
<td>450</td>
</tr>
<tr>
<td>33</td>
<td>500</td>
</tr>
<tr>
<td>50</td>
<td>700</td>
</tr>
<tr>
<td>66</td>
<td>700</td>
</tr>
</tbody>
</table>
6.2.3 Guidelines for the development and use of alternative safe approach distances—special

An alternative safe approach distance—special may be required where the distances advised in Table 2 are not suitable for a particular task or process.

Determination and use of an alternative distance shall be subject to the following controls, which shall be in addition to the requirements of section 6.2.2:

- be determined in accordance with ENA National Guidelines for safe approach distances to Electrical Apparatus’ (ENA NENS 04) and related standards and guidelines as may be appropriate; and
- be applied only to a specific task or process that has been subject to a formal risk assessment carried out in advance of the work using a consultative process with subject matter experts; and
- be documented as an approved procedure specific to the task or process.

6.3 Safe approach distances—vehicles

6.3.1 Ordinary persons

An ordinary person in charge of any vehicle, except mobile plant when in working mode, shall ensure that no part of the vehicle or its load is placed or moved within the distances shown in column 2 of Table 3.

6.3.2 Authorised and instructed persons

Authorised and instructed persons in charge of any vehicle, except mobile plant when in working mode, shall ensure that no part of the vehicle or its load is placed or moved within the distances shown in column 3 of Table 3.
<table>
<thead>
<tr>
<th>Nominal phase to phase voltage AC (kV)</th>
<th>Safe approach distance— for vehicles under the control of ordinary persons (Note 1 and 2) (millimetres)</th>
<th>Safe approach distance— for vehicles under the control of instructed persons or authorised persons (Note 1) (millimetres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low voltage</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>HV up to and including 33</td>
<td>1000</td>
<td>700</td>
</tr>
<tr>
<td>50</td>
<td>1000</td>
<td>750</td>
</tr>
<tr>
<td>66</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>110</td>
<td>1500</td>
<td>1000</td>
</tr>
<tr>
<td>132</td>
<td>1500</td>
<td>1200</td>
</tr>
<tr>
<td>220</td>
<td>4600</td>
<td>1800</td>
</tr>
<tr>
<td>275</td>
<td>4600</td>
<td>2300</td>
</tr>
<tr>
<td>330</td>
<td>5500</td>
<td>3000</td>
</tr>
<tr>
<td>400</td>
<td>6400</td>
<td>3300</td>
</tr>
<tr>
<td>500</td>
<td>6400</td>
<td>3900</td>
</tr>
<tr>
<td>Nominal pole to earth DC Voltage (kV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±25</td>
<td>1000</td>
<td>700</td>
</tr>
<tr>
<td>±85</td>
<td>1500</td>
<td>1000</td>
</tr>
<tr>
<td>±150</td>
<td>1500</td>
<td>1200</td>
</tr>
<tr>
<td>±270</td>
<td>4600</td>
<td>1800</td>
</tr>
<tr>
<td>±350</td>
<td>5500</td>
<td>2500</td>
</tr>
<tr>
<td>±400</td>
<td>6400</td>
<td>2900</td>
</tr>
</tbody>
</table>

**Notes:**
1. All distances specified are based on work from a stable surface. Appropriate allowance **shall** be made for conductor sag and sway and for uncontrolled movement of vehicle or plant due to any reason.
2. See definition for *ordinary person*. Persons not under control of the asset owner (network operator or *HV customer*) shall refer to the WorkSafe or ESV No Go Zone Rules and Section 12 of the Code.
6.4 Safe approach distances—uninsulated mobile plant

6.4.1 General

Due to the physical capabilities of, and potential hazard with, mobile plant working adjacent to live conductors and/or electrical apparatus, specific consideration including earthing, shall be given to its use during planning of the work. (Refer to section 5.2)

6.4.2 Ordinary persons

An ordinary person (under the control of the asset owner) in charge of the work shall ensure that the mobile plant, its gear and load are not placed or moved within the distances. (See Table 4)

A person not under the control of the asset owner shall comply with No Gone Zone Rules. The asset owner shall comply with section 12 of the Code.

6.4.3 Instructed persons or authorised persons

An instructed person or authorised person in charge of the work shall ensure that the uninsulated mobile plant, its gear and load shall not approach live conductors and/or electrical apparatus within the distances, as shown in Table 4.

When the work requires a closer approach to live conductors than the normal safe approach distances given in Table 4, special safe approach distances for uninsulated mobile plant may be developed and applied with consideration of the requirements set out in 6.2.3.

The use of helicopters for bare hand live-line work is excluded from the requirements of this section.

6.5 Safe approach distance—insulated mobile plant

Only instructed persons or authorised persons may operate insulated mobile plant in accordance with Table 5 and approved procedures.

The insulated portion of mobile plant may be allowed to contact or encroach the safe approach distances of a live conductor as specified in Table 5, provided it is rated for that use.
Table 4: Safe approach distance for uninsulated mobile plant to live exposed conductors when in the working mode

<table>
<thead>
<tr>
<th>Nominal phase to phase voltage AC (kV)</th>
<th>Safe approach distance—for mobile plant under the control of ordinary persons (Note 1, 4 and 5) (millimetres)</th>
<th>Safe approach distance—for mobile plant under the control of instructed persons or authorised persons. For insulated mobile plant refer Table 5 (Notes 1 and 2) (millimetres)</th>
<th>Safe approach distance—for mobile plant under the control of glove &amp; barrier live-line work authorised persons. For insulated mobile plant refer Table 5 (Notes 1, 2 and 3) (millimetres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low voltage</td>
<td>2000</td>
<td>1000</td>
<td>380</td>
</tr>
<tr>
<td>HV up to and including 33</td>
<td>2000</td>
<td>1200</td>
<td>1000</td>
</tr>
<tr>
<td>50</td>
<td>2000</td>
<td>1300</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>2000</td>
<td>1400</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>4000</td>
<td>1800</td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>4000</td>
<td>1800</td>
<td></td>
</tr>
<tr>
<td>220</td>
<td>4600</td>
<td>2400</td>
<td></td>
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<tr>
<td>275</td>
<td>4600</td>
<td>3000</td>
<td></td>
</tr>
<tr>
<td>330</td>
<td>5500</td>
<td>3700</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>6400</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>6400</td>
<td>4600</td>
<td></td>
</tr>
</tbody>
</table>

Nominal phase to phase voltage AC (kV)

<table>
<thead>
<tr>
<th>Nominal phase to phase voltage AC (kV)</th>
<th>Safe approach distance—for mobile plant under the control of ordinary persons (Note 1, 4 and 5) (millimetres)</th>
<th>Safe approach distance—for mobile plant under the control of instructed persons or authorised persons. For insulated mobile plant refer Table 5 (Notes 1 and 2) (millimetres)</th>
<th>Safe approach distance—for mobile plant under the control of glove &amp; barrier live-line work authorised persons. For insulated mobile plant refer Table 5 (Notes 1, 2 and 3) (millimetres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>±25</td>
<td>2000</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>±85</td>
<td>4000</td>
<td>1800</td>
<td></td>
</tr>
<tr>
<td>±150</td>
<td>4000</td>
<td>1800</td>
<td></td>
</tr>
<tr>
<td>±270</td>
<td>4600</td>
<td>2400</td>
<td></td>
</tr>
<tr>
<td>±350</td>
<td>5500</td>
<td>3200</td>
<td></td>
</tr>
<tr>
<td>±400</td>
<td>6400</td>
<td>3600</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. All distances specified are based on work from a stable surface. Appropriate allowance shall be made for conductor sag and sway and for uncontrolled movement of vehicle or plant due to any reason.
2. A safety observer is required unless the mobile plant is incapable of infringing the safe approach distance.
3. When lifting a load the conductors are suitably insulated in accordance with approved procedures.
4. Including insulated elevating work platforms.
5. See definition for ordinary person. Persons not under control of the asset owner (network operator or HV customer) shall refer to the WorkSafe / ESV No Go Zone Rules and section 12 of the Code.
**Table 5:** Safe approach distances to live exposed conductors for insulated mobile plant operated by persons who are instructed or authorised to work on or near exposed conductors

<table>
<thead>
<tr>
<th>Nominal phase to phase AC voltage (kV)</th>
<th>Safe approach distances (Note 1, 2, 3 and 6) (millimetres)</th>
<th>Working within safe approach distance (Note 1, 3, 4, 5 and 6) (millimetres)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insulated portions</td>
<td>Uninsulated portions</td>
</tr>
<tr>
<td>Low voltage</td>
<td>Contact allowable</td>
<td>1000</td>
</tr>
<tr>
<td>HV up to and including 33</td>
<td>700</td>
<td>1200</td>
</tr>
<tr>
<td>66</td>
<td>1000</td>
<td>1400</td>
</tr>
<tr>
<td>132</td>
<td>1200</td>
<td>1800</td>
</tr>
<tr>
<td>220</td>
<td>1800</td>
<td>2400</td>
</tr>
<tr>
<td>275</td>
<td>2300</td>
<td>3000</td>
</tr>
<tr>
<td>330</td>
<td>3000</td>
<td>3700</td>
</tr>
<tr>
<td>500</td>
<td>3900</td>
<td>4600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal pole to earth DC voltage (kV)</th>
<th>Safe approach distances (millimetres)</th>
<th>Working within safe approach distance (millimetres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>± 25</td>
<td>700</td>
<td>Contact allowable 1000</td>
</tr>
<tr>
<td>± 85</td>
<td>1000</td>
<td>Contact allowable 1000</td>
</tr>
</tbody>
</table>

**Notes:**
1. These distances specified are based on work from a stable surface. Appropriate allowance shall be made for conductor sag and sway, and for uncontrolled movement of the mobile plant for any reason.
2. For ordinary persons refer to Table 4.
3. For safe approach distance where contact is allowed, care shall be exercised to prevent movement of conductors.
4. For live work in accordance with approved procedures.
5. Alternative live work minimum approach distances as per 9.6 may be applied in accordance with organisational procedures.
6. A safety observer is required unless the mobile plant is incapable of infringing the safe approach distance.
6.6 Emergency approach
In emergency situations where there is likely risk of electric shock to persons from electrical conductors or electrical apparatus (e.g. fallen conductor), prompt action shall be taken to ensure people are kept well clear of the hazard in accordance with approved procedures.

All electrical apparatus shall be considered alive until proven isolated and earthed by approved means.

6.7 Contact with live high voltage conductors by means of appliances
Only approved and tested appliances shall be permitted to be brought within the safe approach distance or into direct contact with live high voltage conductors.

6.8 Approach to live high voltage insulated cables
6.8.1 General
When work is performed near live high voltage insulated cables, appropriate precautions shall be taken to ensure that the insulation of the cables is not damaged. Cables, which are specifically designed for movement while live, may be moved in accordance with approved procedure.

Slight movement of other types of live cables may be permitted, but only after detailed consideration of all related circumstances by a person with a detailed knowledge of the cables concerned, who shall fully detail all precautions to be taken.

6.8.2 Earthed metallic sheathed or screened high voltage cables
Contact by persons may be made to external non-conductive surfaces of live high voltage cables with earthed metallic sheaths or screens. Contact with exposed metallic sheath or screen shall only be undertaken after consideration of including transferred earth potentials and induced voltages.

6.8.3 Non-metallic screened high voltage aerial bundled cable
No contact by persons shall be made to external surfaces of live non-metallic screened high voltage aerial bundled cable or its exposed support catenary. Suitable live work techniques only shall be used for this purpose.

Access to de-energised but not earthed non-metallic screened high voltage aerial bundled cable may be permitted in accordance with approved procedures.

For the purposes of insulated mobile plant work in the vicinity of live non-metallic screened high voltage aerial bundled cable, the safe approach distance shall be the same as exposed high voltage conductors. (Refer to Table 5)
6.9 Work in stations
A person shall not perform work in any station or allow mobile plant to enter any station without first obtaining the permission of the person in charge of the station or appropriate authorised person and accepting all the conditions imposed by that person. (Refer to section 5.1)

6.10 Work outside of stations
Work on or near electrical apparatus outside of stations shall be performed after obtaining the permission and direction of the person in charge of the electrical apparatus.
**Principle**

Only *authorised persons* shall undertake switching and associated duties on *high voltage electrical apparatus.*

### 7.1 Persons authorised to operate high voltage electrical apparatus

Switching and associated duties on *high voltage electrical apparatus* shall be performed by *authorised electrical operators* whose training, duties and instructions cover the particular *electrical apparatus*. However, an *unauthorised person* may perform operations in the following circumstances:

a) when specifically instructed by, or authorised by, the appropriate *operating authority*; or

b) when specifically instructed by an authorised operator as part of electrical operator training; or

c) in an emergency involving serious risk to persons or property; or

d) when controlling *high voltage electrical apparatus* as part of a task for process control in accordance with *approved organisational procedures*.

### 7.2 Written HV Switching Instructions

Wherever practicable, written instructions *shall* be used when operating *high voltage electrical apparatus*.

### 7.3 High voltage switching

Prior to a *high voltage* switching operation, the available information regarding circuit conditions *shall* be taken into account and no electrical apparatus *shall* be operated if it is inappropriate for the duty to be performed. After switching, correct operation of the *electrical apparatus* *shall* be confirmed whenever practicable.

When *high voltage electrical apparatus* is operated, the person undertaking the task *shall* be protected in an *approved* manner from electric shock, arc flash or other hazards. (Also refer to 3.9)
8 Earthing of high voltage electrical apparatus

**Principle**
Effective earthing device shall be applied to ensure the safety of the work party. Earthing devices shall be applied by an authorised person following a safe to earth confirmation.

**8.1 General requirements**

**8.1.1** The earthing of apparatus presents risks to persons performing the earthing and other persons nearby. Organisations shall establish approved procedures to mitigate risk to persons.

**8.1.2** Earthing devices shall be suitably rated and approved. They shall be inspected and/or tested in accordance with organisational procedures. Only authorised persons shall apply earthing devices and only after completion of a safe to earth confirmation that the electrical apparatus is isolated and de-energised.

Confirmation of isolation shall be by:
- visual inspection of isolation(s) and testing of the conductors
- where visual inspection of isolation(s) is not practicable, inquiry and testing shall be used
- where testing is not practicable, earthing may take place only in accordance with approved procedures.

**8.1.3** In applying an earthing device, it shall be connected to earth before it is applied to the conductors, and it shall be removed from the conductors before it is disconnected from earth.

**8.1.4** Wherever practicable, an earth shall be applied and removed by an approved device.

When hand application or removal is unavoidable:
- all phases shall be discharged; and
- another earth shall be held in contact with the conductor using an approved device while the hand applied earth is being attached or removed.

**8.1.5** Then applying a portable earthing device that is not connected to a permanently installed station earthing system or an electrically conductive transmission structure it shall be regarded as being liable to become live until the circuit earthing is complete.

**8.1.6** There are some situations when applying earths to electrical apparatus during the preparation for access (e.g. discharging capacitor banks) that an authorised electrical operator cannot comply with the clearances specified as safe approach distances. In these situations, approved procedures may permit such approach only to that part of the electrical apparatus that already has local isolation and earthing.
8.2 Earthing for access to high voltage electrical apparatus

Earths shall be applied at locations such that conductors within the work area are effectively earthed in the event of energisation from any source of supply or hazardous occurrences and be placed so as to remain effective if adjoining conductors are disconnected.

Wherever practicable earths shall be placed at the site of the work.

8.3 Earthing of overhead lines

Where an overhead line is earthed the work planning shall consider protection from the hazards resulting from step and touch potentials in the event of energisation by any means, including (for example) direct connection, equipment failure, induction or lightning.

Where work under an access authority involves the connection, cutting or disconnection of conductors, approved bridging leads shall be applied across the proposed conductor break, or earths shall be applied to both sides of (and as close as practicable to) the proposed break and individually connected to a common earth.

In situations where there is the risk of a worker becoming subject to different potentials across or between different earths, the hazard will be reduced by the application of equipotential work zone principles.

8.4 Overhead lines (priority earthing preferences)

The choice of connection for a portable earthing device shall be made to achieve the most effective earthing of the work zone. In accordance with the system being worked on, earths should be applied on the basis of the following order of preference:

1. Permanently installed earthing system including CMEN.
2. Earthing ferrule in a concrete pole.
3. The ground rod of an installed pole stays or permanently driven pole stakes.
4. A temporarily driven spike at the work site.

8.5 High voltage metal clad switch units

Earthing of metal clad switchgear and connected circuits by the use of probes or contact extension devices requiring manual application presents additional hazards.

Approved procedures shall define methods of operation and earthing to minimise the risk to the person applying the earth. The procedure shall include a safety observer to be present during such earthing, unless procedures specifically allow application by one person.
8.6 High voltage capacitors

A safe method of discharging high voltage capacitors prior to access shall be included in approved procedures.

When earthing high voltage capacitors, the actives and where available the neutrals shall be earthed and, in addition, each capacitor shall be discharged before it is touched.

The same precautions shall be taken for work on electrical apparatus which incorporates high voltage capacitors e.g. capacitor voltage transformers, carrier coupling capacitors.

8.7 Aerial supervisory cables

Aerial supervisory cable shall be regarded as a screened and insulated live low voltage cable and all appropriate procedures and precautions for such cables shall be followed. Such precautions are required because of induction from parallel high voltage lines.

When an aerial supervisory cable is being jointed or re-terminated, initially both the screen and catenary wires of both cables shall be bonded and earthed at the worksite. These shall then be insulated in an approved manner and the work on the cables shall proceed in an insulated situation.

As a minimum the catenary wire of aerial supervisory cables is permanently earthed at alternative sectionalising points to provide safe working conditions.

Any work involving the disconnection of the catenary wire from the permanent earth shall not proceed until the catenary wire is earthed by means of local temporary earths attached to both sides of the sectionalising point.
9 Access for work on or near high voltage electrical apparatus

**Principle**
An appropriate safe access system *shall* be applied to ensure the safety of work crews for work on or near high voltage electrical apparatus or associated with the testing of high voltage apparatus.

**9.1 General**
No person *shall* touch or work on or near the high voltage conductors of any electrical apparatus unless:

a) the person is a recipient of an electrical access permit covering that electrical apparatus and the high voltage conductors have been discharged and/or earthed at the work site, and the electrical access permit is available for reference at the site of the work; or

b) the person is a recipient of an electrical access permit covering the conductors of a high voltage cable and the de-energised state of the cable at the work site is confirmed in accordance with section 9.8 and the electrical access permit is available for reference at the site of the work; or

c) 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

d) the person is working under the terms of a sanction for testing or alternative approved procedure on that electrical apparatus in accordance with section 9.3; or

e) the electrical apparatus has been declared as *out of commission* in accordance with section 9.4; or

f) the person is performing *live* work in accordance with approved procedures; or

g) the person is working in accordance with the requirements of a permit to work adjacent to network assets (refer to section 12); or

h) the person is working in accordance with the requirements of section 6.

**9.2 Electrical access permit procedure**

**9.2.1 Planning for an electrical access permit**
Before making an application for an electrical access permit, the authorised applicant *shall* establish that the proposed work has been properly planned and can be carried out safely.

The electrical apparatus to be covered and its location *shall* be accurately defined and the work to be undertaken adequately described.
9.2.2 Multiple working parties

There shall be coordination in planning and performing the work to ensure that the actions of one party shall not endanger the safety of others when more than one electrical access permit is issued on the same electrical apparatus, or where separate parties are working under the terms of one electrical access permit.

9.2.3 Multiple ownership

Where the operational control of the scope of electrical apparatus to be covered is owned by more than one organisation, a protocol shall be established between these organisations for processing the application and outage requirements.

9.2.4 Issue, receipt and cancellation of electrical access permits

9.2.4.1 An electrical access permit shall be issued and cancelled only by an authorised electrical operator. Electrical access permits may be issued or relinquished by telephone or radio subject to the statements between the authorised electrical operator and the recipient in charge being confirmed by a witness at each end.

9.2.4.2 At the time of issue of an electrical access permit the authorised electrical operator shall describe and show, where practicable, the recipient in charge and all the initial recipients:

a) the electrical apparatus covered by the electrical access permit; and
b) the precautions taken; and
c) the nearest points of supply; and
d) any adjacent live electrical apparatus.

In the case of an electrical access permit issued by telephone or radio, the recipient in charge shall assume these responsibilities on behalf of the authorised electrical operator.

9.2.4.3 An electrical access permit shall be either cancelled or suspended prior to the issue of a sanction for testing or the use of an alternative approved procedure for testing on the same electrical apparatus.

9.2.4.4 High voltage live work and work under an access authority shall not be performed concurrently on the same structure.

9.2.4.5 Each electrical access permit shall be issued to a recipient in charge. The recipient in charge shall ensure that all members of the work party who will approach the electrical apparatus sign on the electrical access permit.
9.2.4.6 The issuer and authorised recipients all have a responsibility to ensure that the scope and the condition of the electrical apparatus covered by the electrical access permit is such that it shall be safe for the proposed work to be undertaken.

9.2.4.7 All recipients shall be satisfied with the precautions taken, the location of the points of supply, and the proximity of any adjacent live electrical apparatus.

9.2.4.8 Any person involved in the issue or receipt of an electrical access permit who is not satisfied with the conditions, may apply to have additional precautions taken, either before the electrical access permit is issued or during the currency of the work.

9.2.4.9 After the issue of an electrical access permit, no additional recipients are allowed to sign onto the permit unless appropriate instructions are given by the recipient in charge, as per section 9.2.4.5. An authorised electrical operator, acting with the knowledge of the recipient in charge, may undertake this activity.

9.2.5 Persons permitted to sign onto electrical access permits

Persons permitted to sign onto electrical access permits shall be authorised recipients or instructed persons assigned to work under that specific electrical access permit. In the latter case it shall be the responsibility of the recipient in charge to ensure that such persons are placed in the charge of an authorised recipient.

The conditions under which an authorised person shall sign-on to an electrical access permit is that the authorised recipient:

a) understands the electrical apparatus covered and the limits of the electrical access permit; and

b) is satisfied with the precautions taken; and

c) is aware of the nearest adjacent live electrical apparatus.

The conditions under which an instructed person shall sign-on to an electrical access permit is that the instructed person:

a) understands instructions given on what approach is permitted to the electrical apparatus; and

b) understands instructions given on what activity is permitted to be taken in relation to the electrical apparatus; and

c) agrees to the continuous and close supervision by a nominated authorised recipient.
9.2.6 Recipient working alone

An electrical access permit may be issued to a single authorised recipient. The recipient may work alone provided there is no risk of infringing the safe approach distances and the recipient is working in accordance with approved procedures.

9.2.7 Issuer also a recipient

An issuer of an electrical access permit shall not be the initial recipient in charge, but may sign-on to the electrical access permit form as an authorised recipient.

In accordance with approved procedures, the issuer may sign-on as a subsequent recipient in charge.

9.2.8 Rejection of a recipient

A person shall recommend the exclusion from an electrical access permit of any other person who at any time is considered unsafe as a recipient. Such instances shall be reported promptly to the person in charge of the work.

9.2.9 Earthing of electrical apparatus under electrical access permit

9.2.9.1 Absence of an earth

Electrical apparatus shall be earthed before the issue of an electrical access permit, wherever practicable.

Where an earth has not been applied to electrical apparatus prior to the issue of an electrical access permit, the recipient in charge shall arrange for discharging and/or earthing of the electrical apparatus before any recipient touches the high voltage conductors.

9.2.9.2 Recording of earths

All earths applied prior to and during the currency of an electrical access permit shall be recorded on the electrical access permit or documented in accordance with organisational procedures.

The removal of all earths shall be verified prior to re-energising the apparatus.

9.2.9.3 Removal of earth when working under an access authority

During work under an access authority, the recipient in charge may authorise the removal of an earth for testing, reconductoring, or other purposes, only if such action is considered necessary and safe, and provided:

a) the operating authority that has operational control of the earth and the operating authority who applied the earth agree; and

b) in cases where the earth is listed on the access authority, the operating authority who issued the access authority is consulted, to confirm that the removal of the earth will not affect any other access authorities that have been issued; and

c) all persons likely to be affected by the removal of the earth are notified; and

d) consideration is given to induced voltages.

The earth removed shall be replaced in the same, or other equally effective position, as soon as possible.
9.2.10 Temporary cessation of work or absence of recipients

Following a temporary cessation of work or when recipients have been temporarily absent from the work site, upon return each recipient shall report to the recipient in charge to re-confirm the conditions of the electrical access permit.

9.2.11 Testing under an electrical access permit

Testing under an electrical access permit may be undertaken in accordance with approved procedures that include a risk assessment to ensure that:

a) all other work shall cease for the duration of the testing; and

b) no hazardous voltages and currents will be accessible as a result of the testing; and

c) recipient/s conducting the testing have the appropriate competency; and

 d) consideration shall be given to any stored electrical charge; and

 e) test voltages and current do not exceed the equipment rating or test equipment rating; and

 f) consideration shall be given to maintain earth between the recipient/s and the sources of supply; and

 g) consideration shall be given to the hazards of connecting and disconnecting test equipment; and

 h) adequate precautions are taken for the safety of all persons during the performance of the test; and

 i) the provisions of section 9.2.9.3 are met.

9.2.12 Working on multi-circuit overhead lines

Where more than one high voltage circuit is carried on a pole or line structure and work is to be performed on circuits under an electrical access permit while others remain live, each recipient of the work party who approaches near any circuits shall correctly identify the circuit/s under electrical access permit and all other circuits.

If there is any doubt the recipient shall seek clarification from the recipient in charge.

9.2.13 Change of electrical access permit conditions

The conditions specified and the precautions listed on the electrical access permit 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 electrical access permits and all recipients working under the electrical access permit have been notified of the change.

9.2.14 Cancellation of an electrical access permit

9.2.14.1 Recipients signing off an electrical access permit.

It shall be the duty of each recipient of an electrical access permit to sign-off before the electrical access permit is relinquished.
9.2.14.2 Responsibilities of the recipient in charge when relinquishing an electrical access permit for cancellation.

When an electrical access permit is to be relinquished for cancellation, the recipient in charge shall:

a) ensure all recipients signed on to the electrical access permit have ceased work covered by the electrical access permit and have signed off; and

b) ensure all recipients and equipment are clear and will remain clear of the electrical apparatus; and

c) sign-off the electrical access permit; as the recipient in charge to indicate that the electrical access permit can be cancelled; and

d) advise the operating authority of any condition of the electrical apparatus that could affect its operation.

Having the recipient in charge as the cancelling operator is undesirable and should be avoided. Appropriate approved procedures shall be established to cover instances where this is unavoidable.

9.2.14.3 Absence of a recipient at relinquishment.

The practice of signing off an electrical access permit on behalf of another person is undesirable and should be avoided.

Appropriate organisation procedures should be implemented with instruction for signing off recipients where the recipients could not sign-off in person.

9.3 Testing HV electrical apparatus procedure

9.3.1 General

The sanction for testing or an alternative approved authorisation for testing shall be used if the testing of high voltage electrical apparatus has the potential to produce currents and voltages hazardous to the human body.

The alternative approved procedure shall satisfy the requirements of section 9.3 to achieve the same or better safety outcomes.

9.3.2 Planning for testing of high voltage apparatus

Only an authorised applicant shall make application for a sanction for testing.

Before making an application for sanction for testing the authorised applicant shall establish that the proposed work has been properly planned and can be carried out safely.

The electrical apparatus to be tested and its location shall be accurately defined and the task to be undertaken adequately described.

Testing shall be undertaken in accordance with approved procedures and adequate precautions shall be taken to avoid exposure to hazardous voltages and currents.
Only one sanction for testing shall be on issue on the same electrical apparatus at any time. However, where the testing requires work at remote locations as well as at the nominated main location, a complementary sanction for testing covering the same electrical apparatus shall be issued at each remote location.

Where a complementary sanction for testing is required, it shall be nominated on the original application and issued only in accordance with section 9.3.

Where the test is to be undertaken on electrical apparatus having more than one control authority involvement then protocols shall be established for processing the application and test requirements.

9.3.3 Sanction for testing procedure

9.3.3.1 A sanction for testing shall be either cancelled or suspended prior to the issue of an electrical access permit on the same electrical apparatus.

9.3.3.2 The sanction for testing shall be issued to the tester in charge by an authorised electrical operator.

A complementary sanction for testing shall be issued only after, and relinquished only before, the sanction for testing at the nominated main location.

Such issues and cancellations shall take place only with the approval of the tester in charge.

9.3.3.3 A tester responsible at remote location is an authorised tester at a remote location to whom an authorised electrical operator has issued a complementary sanction for testing.

9.3.3.4 Sanctions for testing and complementary sanctions for testing shall be issued and cancelled only by an authorised electrical operator.

9.3.3.5 The appropriate provisions of sections 7, 8, and 9 shall also apply to sanctions for testing and complementary sanctions for testing.

9.3.3.6 Sanctions for testing and complementary sanctions for testing may be issued or relinquished by telephone or radio, subject to the statements between the authorised electrical operator and the tester in charge or tester responsible at remote location, as appropriate, being confirmed by a witness at each end.

9.3.3.7 In the case of a sanction for testing or a complementary sanction for testing issued by telephone or radio, the tester in charge or the tester responsible at remote location, as appropriate, shall assume the responsibilities of the authorised electrical operator in applying these provisions.
9.3.4 Persons permitted to sign onto sanctions for testing

Persons permitted to sign onto a sanction for testing shall be authorised testers, authorised electrical operators, authorised recipients or instructed persons approved to work under that specific sanction for testing.

In the case of authorised electrical operators, authorised recipients or instructed persons, it shall be the responsibility of the tester in charge or the tester responsible at remote location to ensure that such persons are placed in the charge of an authorised tester, who may be the tester in charge.

The conditions under which an authorised tester shall sign on to a sanction for testing are the authorised tester:

a) understands the electrical apparatus covered and the limits of the sanction for testing; and

b) is satisfied with the precautions taken; and

c) is aware of the nearest adjacent live electrical apparatus.

The conditions under which an authorised electrical operator or authorised recipient shall sign on to a sanction for testing are that the authorised electrical operator or recipient:

a) understands instructions given on what approach is permitted to the electrical apparatus; and

b) understands instructions given on what activity is permitted to be taken in relation to the electrical apparatus; and

c) aware of the nearest adjacent live electrical apparatus; and

d) agrees to the general supervision by a nominated authorised tester.

The conditions under which an instructed person shall sign-on to a sanction for testing are that the person:

a) understands instructions given on what approach is permitted to the electrical apparatus; and

b) understands instructions given on what activity is permitted to be taken in relation to the electrical apparatus; and

c) is made aware of the nearest adjacent live electrical apparatus; and

d) agrees to the continuous and close supervision by a nominated authorised tester.
9.3.5 Responsibilities of tester in charge

9.3.5.1 The tester in charge shall ensure that the members of the work party who will be making contact with electrical apparatus under test and any of the test connections or approaching within the prescribed safe approach distances during the currency of the sanction for testing, sign onto the sanction for testing or a complementary sanction for testing.

9.3.5.2 The tester in charge shall ensure that the members of the work party are suitably experienced and trained for the work required of them and that adequate precautions are taken for the safety of all persons.

9.3.6 Complementary sanctions for testing—responsibilities of tester responsible at remote location

The tester responsible at remote location shall assume the same responsibilities as specified for the tester in charge, and shall function under direction of the latter.

9.3.7 Relinquishment of sanctions for testing

9.3.7.1 When relinquishing a sanction for testing, the tester in charge shall advise the operating authority of the condition of the electrical apparatus at all related locations.

9.3.7.2 Where complementary sanctions for testing have been issued, each tester responsible at remote location shall:

a) advise the tester in charge of relinquishment of the complementary sanction for testing and the condition of the electrical apparatus at the remote location

b) advise the operating authority at the remote location of the condition of the electrical apparatus at that location.

The tester in charge shall ensure that all complementary sanctions for testing have been relinquished prior to relinquishing the sanction for testing.
9.4 Out of commission electrical apparatus

9.4.1 Declaring electrical apparatus out of commission

An out of commission declaration shall include a statement of the condition of the electrical apparatus, as well as all relevant auxiliary equipment, including, but not limited to, control circuits, compressed air supplies and alternative energy sources.

9.4.2 Access to out of commission electrical apparatus

Electrical apparatus that is declared out of commission may be approached and worked upon without the issue of an electrical access permit.

Although the electrical apparatus is not electrically connected, consideration shall be given to the possibility of inadvertent energisation from adjacent electrical apparatus, induction, lightning, static charges or other means and appropriate controls applied.

9.5 Suspension of an access authority

9.5.1 General

When the operating authority and the recipient/tester in charge agree, an access authority can be suspended in accordance with approved procedures.

9.5.2 Conditions for suspension of an access authority

Approved procedures for suspension of an access authority shall ensure that:

a) an access authority is not considered suspended until all recipients have signed off; and

b) recipients sign off and have no access to the electrical apparatus while the access authority is suspended; and

c) the operating authority is informed of the condition/status of the electrical apparatus.

9.5.3 Procedure for suspension of an access authority

Approved procedures for suspension of an access authority shall ensure that:

a) the recipient or tester in charge ensures that all recipients sign-off and are informed that the access authority is suspended and no further access is permitted; and

b) the operating authority is notified of the status of the electrical apparatus; and

c) while suspended the access authority is under the control of the operating authority.
9.5.4 Procedure for resumption of an access authority

Approved procedures for resumption of an access authority shall ensure that:

a) the access authority is resumed with the same isolations, earths and other precautions at the time of suspension; and

b) the operating authority shall approve the resumption of the access authority and where considered necessary use the procedure for issue of the access authority; and

c) the recipient/tester in charge ensures that recipients are informed of the limits of the access authority and precautions taken.

9.6 Live work—high voltage

Section 9.6 is not applicable to the operation, washing or testing of live high voltage electrical apparatus. Refer to approved procedures.

9.6.1 General

Live work shall only be undertaken after first considering performing the work under isolated and earthed conditions.

Before live work is undertaken a hazard identification and risk assessment shall confirm that the work can be performed safely.

All live work shall be conducted in accordance with approved procedures and approved live work minimum approach distances.

When developing approved procedures, determining live work minimum approach distances and performing the tasks the following shall be considered:

a) AS 5804 (High voltage live working) and related standards and guidelines as may be appropriate; and

b) electrical and ergonomic distances necessary to prevent flashover; and

c) possibility of inadvertent movement; and

d) minimising the duration of work at the live work minimum approach distances; and

e) work techniques that provide maximum practical distance from live conductors; and

f) limiting overvoltage conditions by operational or site controls; and

g) work crew on site risk assessment; and

h) control of inadvertent movement by the use of insulating barriers, insulated plant and appliances and controlled body movements; and

i) environmental conditions.
9.6.2 Minimum requirements

The procedures for undertaking live work shall include:

a) persons performing live work and appointed safety observers shall be authorised live high voltage workers; and

b) persons when specifically instructed and supervised by an authorised live high voltage worker as part of live high voltage worker training; and

c) the risk assessment shall consider as a minimum:
   - the condition of the electrical apparatus; and
   - proximity of other electrical apparatus; and
   - proximity of earthed equipment and structures; and
   - protection and control settings; and
   - appointment of a safety observer; and

d) persons performing live work shall use appropriate rated and tested equipment and wear appropriate apparel; and

e) the work shall be performed in accordance with approved procedures.

9.6.3 Insulating stick work

An authorised live high voltage worker may access live high voltage conductors using insulating sticks at the distances determined through reference to section 9.6.1.

9.6.4 Glove and barrier work

An authorised live high voltage worker may make insulated contact with live high voltage conductors up to 33kV when fully insulated from earth and other phases using approved and tested personal protective equipment and insulating devices.

9.6.5 Bare hand work

An authorised live high voltage worker may make bare hand contact with live high voltage conductors of 220kV and above provided they are fully insulated from earth and other conductors at different potentials by means of air gaps appropriate to the voltage of the conductors and the precautions applied.

9.7 Preparing high voltage electrical apparatus for access

9.7.1 Isolation and earthing

High voltage electrical apparatus should not be regarded as being safe for the issue of an electrical access permit until it has been isolated and earthed.

Whenever practicable, all isolation points should be tagged.

Consideration shall be given to the isolation of sources of supply from low voltage or secondary circuits.

Approved procedures shall ensure the integrity of the isolation is maintained during currency of the electrical access permit.
Isolation for access shall either be visible, or an approved means used to confirm that the electrical apparatus is de-energised.

Note: such isolation may not eliminate the effects of electrical or magnetic induction.

Earths shall be applied as described in section 8.2. If earthing is impracticable, other appropriate precautions shall be taken and the authorised electrical operator shall advise the recipient in charge and record the absence of an earth on the electrical access permit.

9.7.2 Barriers and signs

9.7.2.1 General

Appropriate barriers shall be used where necessary to indicate areas containing live electrical apparatus and the degree of hazard.

Appropriate signs shall be used where necessary to:

a) identify electrical apparatus covered by an access authority; and

b) identify adjacent live electrical apparatus and related hazard.

Barriers shall not be altered or crossed except in accordance with approved procedures.

In particular instances where identification is positive, such as on some high voltage overhead lines and underground cables, and providing appropriate safeguards have been taken, approved procedures may dispense with the use of barriers and/or signs.

9.7.2.2 Hazards that are likely to be life-threatening

Situations where there is an immediate and probable risk of contact with live electrical apparatus shall be defined by the use of danger barriers and/or signs (refer to 9.7.2.4). For example:

a) areas where safe approach distances cannot be maintained;

b) areas in which high voltage testing is in progress.

9.7.2.3 Hazards that are not likely to be life-threatening

For the purpose of general identification of those areas where warning is necessary, warning barriers and/or signs shall be used. For example, between work areas and adjacent areas containing live high voltage electrical apparatus that does not present an electrical hazard to normal pedestrian movement. (Refer to 9.7.2.4)

9.7.2.4 Descriptions of barriers and signs

Live (Alive) sign

Approved danger sign with the word LIVE (ALIVE) printed in white upon a red background or otherwise conforming to AS1319.

Danger barrier and/or sign

A barrier and/or sign of suitable material coloured red or alternatively red and white, to indicate the presence of danger, or otherwise conforming to AS1319.
Under access permit sign
A sign of appropriate dimensions with the words UNDER ACCESS PERMIT or similar printed in white on a green background or otherwise conforming to AS1319.

Under sanction for testing sign
A danger sign of appropriate dimensions with the words UNDER SANCTION FOR TESTING printed in red on a white background or otherwise conforming to AS1319.

Warning barrier and/or sign
A barrier and/or sign of suitable material, coloured yellow, or alternatively yellow and black, to indicate the need for a warning, or otherwise conforming to AS1319.

9.7.2.5 Barriers and signs for electrical access permits
Prior to the issue of an electrical access permit, barriers and signs shall be erected to:

a) make it clearly evident which electrical apparatus is under electrical access permit and which is not; and

b) guard against mistaken or inadvertent contact with other electrical apparatus.

Additional barriers and signs may be erected after the issue of the electrical access permit by agreement between the authorised electrical operator and the recipient in charge.

9.7.2.6 Barriers and/or signs for sanction for testing
Prior to the issue of a sanction for testing, barriers and signs shall be erected to:

a) make it clearly evident which electrical apparatus is under sanction for testing and which is not; and

b) guard against mistaken or inadvertent contact with other electrical apparatus or equipment under test.

The above shall be achieved with the use of appropriate signs and barriers including danger barriers, live signs and under sanction for testing signs. In positioning signs and barriers consideration shall be given to all approaches to the work area.

Additional barriers and signs may be erected after the issue of the sanction for testing by the tester in charge.
9.7.3 Use of a statement of condition of apparatus/plant (SCAP)

9.7.3.1 General

A SCAP is a statement outlining the condition of apparatus/plant. It shall be used between operating authorities to confirm plant conditions and isolations to support an access authority or other operational requirements.

This statement covers only the state of the electrical apparatus or plant specified and does not by itself authorise work on the electrical apparatus or plant.

9.7.3.2 Use of the SCAP—written and verbal

The conditions of isolation shall remain unchanged until the statement is cancelled.

Any earths listed on the statement may be removed as requested by the recipient in accordance with section 8.3.

The SCAP shall, where practicable, detail all relevant precautions taken for the safety of the work party. Where the precautions are detailed they shall not be changed during the currency of the SCAP.

Where it is not practicable to detail all such precautions, a general statement of the condition of the electrical apparatus (e.g. isolated and earthed) is acceptable provided that:

a) it is acceptable to the operating authorities; and

b) it is acceptable to all recipients on the associated electrical access permit or sanction for testing; and

c) the authorised electrical operator issuing the electrical access permit or sanction for testing can satisfy the recipients of the precautions taken through demonstration or references to drawings, etc.

Where a general statement is used and any isolation point is to be changed, while still maintaining general condition of isolation, prior agreement shall be obtained from all affected operating authorities.

The receiving operating authority shall consult with recipients of affected access authorities before agreeing to any change.
Verbal statements shall only be used between operating authorities when:

a) there is mutual agreement to use verbal statements; and

b) they have established procedures and systems for the centralised logging of information both given and received, regarding the condition of electrical apparatus; and

c) the procedures and systems guard against the inadvertent operation or restoration of electrical apparatus.

### 9.7.4 High voltage metal-clad switchgear and associated electrical apparatus

#### 9.7.4.1 For the purpose of issuing an electrical access permit, a circuit breaker or a voltage transformer may be regarded as isolated and at earth potential when it is racked out, and appropriate precautions taken to prevent re-energisation. (See also section 9.1)

#### 9.7.4.2 For work on busbar circuits, where the physical separation of circuits within a chamber is not visibly evident, additional precautions shall be taken for the safety of the working party.

#### 9.7.4.3 The proposed means of access within metal-clad chambers shall be described to the authorised electrical operator by the recipient in charge and both must agree on the extent of access and that such access is safe.

#### 9.7.4.4 When access is required within spout bushings the contacts shall be confirmed as de-energised by an approved test. The circuit shall also be earthed elsewhere or other precautions taken to ensure that the spout contacts cannot become live by induction or other means.

#### 9.7.4.5 When it is not practicable to earth metal-clad circuits, a risk assessment shall be conducted to determine the special precautions, including discharging, to ensure that the conductors can be regarded as being at earth potential.

### 9.7.5 Rotating high voltage machines

A rotating machine, or circuits connected to it, shall not be regarded as safe for the issue of an electrical access permit while the machine is revolving unless it is on turning gear with earths applied.

These earths may be removed during the currency of an electrical access permit in accordance with section 8.3.
9.8 Working on insulated power or supervisory cables

9.8.1 On-site identification of insulated cables (including out of commission or abandoned cables)

Where it is necessary for a cable to be de-energised to enable access to the cable, the de-energised state should be confirmed on site by positive identification or visually tracing it from one end or by the use of a spiking device.

9.8.2 Spiking of cables

A spiking device may be used to confirm that a cable is de-energised.

When a cable is to be spiked by a power-operated spiking device, the following measures shall be taken:

a) where practicable, the electrical condition of the remote ends of the cable shall be confirmed as isolated and earthed; 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; and

b) an approved cable spiking device shall be used by a person trained in its use and in accordance with approved procedures.

Prior to spiking, the operating authority shall be advised. The operating authority shall prevent the energising or re-energising of any cable in the vicinity of the proposed works until advised that spiking has been completed.

9.8.3 Working under induced voltage conditions

Whenever work is to be carried out on a cable core, sheath, armouring, oil line, etc., of a fully insulated cable system, careful assessment shall first be given to the voltage that may appear on the conductor via induction or other means and appropriate earthing practices and approved work procedures adopted.
10 Placing high voltage electrical apparatus in service

Principle
*High voltage electrical apparatus shall not be placed into service until it has been cleared for service.*

10.1 Clearance for service
An operating authority shall not consider electrical apparatus being available for service until it has been handed over from the constructing or maintaining authority by written notification or by approved procedures.

10.2 Connections to new or out of commission electrical apparatus
Before any electrical connection is made whereby new electrical apparatus or any electrical apparatus previously out of commission can be energised by direct switching or live work procedures:

a) the operating authority shall be notified of the intention to make such connection; and

b) all persons associated with the work, and any others likely to be affected shall be informed that no further work is permitted on the electrical apparatus unless:

* they are recipients of an access authority, or
* live work procedures are used.

To enable the connection to be made, an appropriate access authority or live work procedure shall be used.
11 Low voltage network assets

Principle
Safe working procedures shall be established for work on or near low voltage network assets.

11.1 General
11.1.1 Persons required to work on or near low voltage network assets shall be appropriately trained and authorised.

11.1.2 Work on or near low voltage network assets shall be undertaken in accordance with approved procedures.

11.1.3 Before commencing work on or near any low voltage network assets, they shall firstly be identified as the assets associated with the work to be undertaken.

11.2 Work on or near live low voltage conductors
When work is to be carried out on or near live low voltage network assets, approved precautions shall be taken to prevent simultaneous contact with conductors or conducting objects at different potentials.

11.3 Work on or near de-energised low voltage exposed conductors

11.3.1 Except for protection, control systems, station service supplies, auxiliary circuits and low voltage services, an access authority shall be issued to work on or near the exposed conductors. For this purpose, an electrical access permit or other approved access authority may be used.

11.3.2 The conductors shall be isolated, where practicable.

11.3.3 Exposed conductors shall be proved de-energised in accordance with approved procedures. This shall include testing of all conductors by an approved voltage test.

11.3.4 Control measures shall be taken to:
   a) prevent inadvertent contact with other live exposed conductors, or objects at different potentials; and
   b) minimise the risks from hazardous induced voltages or unknown supplies.

11.3.5 Control measures may include the use of:
   a) blocking and locking of switches;
   b) signs and tags placed at all points of isolation, that shall be removed only with the permission of a person identified in approved procedures;
   c) earths;
   d) bonds;
   e) work planning to minimise the risk of inadvertent contact with live conductors in the vicinity of the work;
   f) insulating and other types of barriers.
12 Work by persons not under the control of the asset owner

**Principle**
The asset owner *shall* have procedures to facilitate a safe system of access, by persons not under the control of the asset owner.

12.1 General
An electrical asset owner *shall* have procedures to facilitate a safe system of access by persons, not under the control of the asset owner, to work near or within safe approach distance or, when appropriate, in the vicinity of electrical apparatus.

For the purposes of this section, persons not under the control of the electrical asset owner are persons or organisations that have no contractual obligation to the electrical asset owner and are not performing work for the asset owner for the particular task.

The electrical asset owner *shall* ensure appropriate instruction is provided on the electrical hazards.

The electrical asset owner *shall* instruct the person controlling the work (not under the control of the asset owner) that the person is responsible for having a safe system of work in place to avoid the risk from electrical hazard and will ensure all persons are aware of the safe system of work.

12.2 Permit to work adjacent to network assets
Where the safe system of access referred to in section 12.1 is used, it *shall* include the use of the permit to work adjacent to network assets.

When a permit to work adjacent to network assets is required, the network asset owner *shall* require a written application to be submitted.

The application *shall* include sufficient information to enable the network asset owner to determine appropriate control measures to enable safe access.

The procedure for the permit to work adjacent to network assets *shall* include:

a) an approved issuer; and
b) nominated person in charge of the work; and
c) control measures (precautions) undertaken by the asset owner; and
d) instructions given to the nominated person in charge of the work; and
e) a process for the issue and cancellation.
12.3 Work on abandoned underground cables

For work by persons (not under the control of the asset owner) on abandoned underground cables the use of a safe system of access shall be considered by the electrical asset owner.

12.4 Electrical safety rules for vegetation management work near overhead powerlines by non-electrical workers

Vegetation management clearing work in this section means the pruning, cutting, trimming or felling of a tree and the assisting to prune, cut, trim or fell a tree where any part of the tree is or may come within, or the work requires any person, tool, equipment or vehicle to come within, the minimum safe distance prescribed in the Electricity Safety Act 1998 (the Act) or associated Regulations for persons who are not employed, engaged or under control of the electrical asset owner.

No person shall perform tree clearing work in the vicinity of live electrical apparatus unless the person:

a) has completed a training course approved by ESV; and

b) has a standard of qualifications, proficiency and experience that enable the person to safely perform the work; and

c) has been endorsed in writing by the organisation (e.g. the employer) to perform the work; and

d) has documented a hazard identification and risk assessment; and

e) has implemented a risk management process to control hazards associated with the work; and

f) complies with Electrical safety rules for vegetation management work near overhead powerlines by non-electrical workers, as published or amended from time to time by ESV.
Appendix A—Information to be contained in forms

This appendix provides information that shall be included and other information that could be considered by organisations in the formal communications associated with procedures referenced in this Code. Unless stated otherwise, the information may be communicated verbally or by written or electronic means.

Application for an access authority

An application for an access authority shall contain sufficient information to determine:

- the type of access authority to be issued; and
- electrical apparatus to be covered; and
- the precautions to be taken.

Examples of information that could be included are:

- work to be done; and
- details of special requirements by work party e.g. hazard control measures, cross-referencing of electrical access permits; and
- instructions to be observed; and
- a unique identifying number; and
- the date, and endorsement of the applicant; and
- time and date for anticipated start and finish of access authority; and
- the work location.

Application for authority to work in the vicinity of electrical apparatus

An application for an authority to work in the vicinity of electrical apparatus shall contain sufficient information to determine:

- work to be done, including details of mobile plant; and
- the work location and work area and access routes.

Examples of information that could be included are:

- details of special requirements by work party e.g. cross-referencing to related access authority and instructions to be observed; and
- unique identification number; and
- date and endorsement of applicant; and
- time and date for start and finish.
Personal authorisations

Authorised persons shall be issued a written statement of their authority.

The statement shall contain:
- the type of authority; and
- any limitations or extensions on the type of authority; and
- the signature of the authorising officer; and
- the date of issue.

The statement could also contain:
- the duration or authorisation review date; and
- the date of reviews and competency tests; and
- signed statement of acknowledgment by the v; and
- the knowledge and skill required for the authority; and
- a description and scope of duties the person is authorised to perform.

Authority to work in the vicinity of electrical apparatus

The details shall contain:
- unique identification number; and
- location of work; and
- description of work, day, commencement date; and
- estimated day and date of completion; and
- instructions to be observed by the work party; and
- receipt, relinquishment and cancelling; and
- signatures, time, date of issue.
Clearance to place electrical apparatus into service (may also be overhead line clearance and underground cable clearance)

The details shall contain:
- a description of the electrical apparatus; and
- being cleared; and
- expected commissioning date; and
- authority to place into service with signature and date from the construction authority; and
- authority to place into service with signature and date from the testing authority; and
- statement that all construction persons are clear and will treat the apparatus as live and provision for construction persons to sign statement; and
- statement that all commissioning tests have been completed by the testing authority and provision for the testing authority to sign and date the statement; and
- statement that the apparatus has been accepted by the operating authority and provision for the operating authority to sign and date the statement.

The details could contain:
- drawing references; and
- description of works; and
- statement of when works ready for general inspection.

Electrical access permit and sanction for testing

The details shall contain:
- unique identification number, location, application number, cancellation due time and date; and
- location or station; and
- sections for electrical apparatus covered; and
- condition of electrical apparatus (for sanction for testing) and precautions taken; and
- section for issue, title, time, date, issued by; and
- sections for receipt, and
- section for condition of electrical apparatus on relinquishment of sanction for testing; and
- section for cancellation, signed, title, time, date.

The details could contain:
- for telephone or radio issue, additional sections for witnesses.
Statement of condition of apparatus/plant (SCAP)

The details shall contain:

- statement of certification of conditions of electrical apparatus and
- sections for signatures of acceptance, relinquishment and cancellation; and
- record of electrical apparatus permits issued; and
- statement that states: “This statement covers only the state of the electrical apparatus specified hereon and does not by itself authorise work on the electrical apparatus”.

Appendix A – Information to be contained in forms