

The Blue Book 2017

Code of Practice on electrical safety for the work
on or near high voltage electrical apparatus



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.

© Energy Safe Victoria

The information contained in this publication is protected by copyright. Energy Safe Victoria hereby grants a non-exclusive licence in this publication to the *recipient* on the condition that it is not disseminated for profit. Energy Safe Victoria encourages the free transfer, copying and printing of the information in this publication if such activities support the purpose and intent for which the publication was developed.

This Code was published by Energy Safe Victoria on 13 November 2017.

Electrical safety committee members at the time of publication

	Company	Sector represented
Adam Beel Chairperson	United Energy Distribution	Electricity Distribution
Des Dalton	ENGIE (Loy Yang B)	Electricity Generation
Andrew Plozza	Ecogen Energy Newport	Electricity Generation
Dennis Munn	AusNet Services	Electricity Transmission
Kai Sui Tnay	AusNet Services	Electricity Distribution
Bill Eastoe	Metro Trains Melbourne	Railway & Tramway networks
David Huntley	Melbourne Water	Electricity customers
Alan Harlow	Optec Pty Ltd	Electricity customers— electricity training provider
Roy Sands	National Electrical and Communications Association	Contractors' Representative
Justine Sordello	Electrical Trades Union and VTHC	Electrical worker's union
Steve Darnley	WorkSafe Victoria	Victorian Safety Regulator
John Stolk	Energy Safe Victoria	Electrical Safety Regulator
Loc Vuong	Energy Safe Victoria	Electrical Safety Regulator

The following persons significantly contributed to the revision:

	Company	Sector represented
David Le Lievre	Past Committee Chair	Electricity customers
David Harden	Past Committee Chair	Electricity distribution
Graeme Watson	Past Committee member	Electricity workers union
Robert Oldfield	Energy Safe Victoria	Technical Support
Barry Heywood	Energy Safe Victoria	Technical Support

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**

Suggestions or comments regarding possible amendments *should* be addressed to:

Energy Safe Victoria
PO Box 262
Collins St West
Melbourne VIC 8007

T (03) 9203 9700
F (03) 9686 2197

info@energysafe.vic.gov.au
www.esv.vic.gov.au

Statement from the Director of Energy Safety

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

Table of Contents

9 **Definitions**

14 1 **Purpose**

15 2 **Scope**

16 3 General safety requirements

3.1 **Hazard identification, risk assessment and control**

3.2 **First aid**

3.3 **Communications**

3.4 **Forms**

3.5 **Use and testing of operating and live-line equipment**

17 3.6 **Insulating sticks**

3.7 **Labelling of electrical apparatus**

3.8 **Ladders**

3.9 **Personal protective equipment**

18 3.10 **Tapes and other measuring devices**

3.11 **Use of safety observers**

3.12 **Fit state for work**

19 3.13 **Work within electric and magnetic fields**

3.13.1 **General**

3.13.2 **Electric fields (50 Hz)**

20 3.13.3 **Magnetic fields**

3.14 **Victim rescue**

21 4 Training and authorisation

4.1 **General**

4.2 **Approved training standard**

4.2.1 **Introduction**

22 4.2.2 **Learning outcomes**

4.2.3 **Training courses**

4.2.4 **Records**

23 5 Work in the vicinity of electrical apparatus

5.1 General

5.2 Use of mobile plant

24 5.3 Handling objects/loads

5.4 Erection or dismantling of overhead conductors

25 5.5 Work by ordinary persons

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

26 6 Approach to electrical apparatus

6.1 General

29 6.2 Safe approach distance—persons

6.2.1 Safe approach distance—normal

31 6.2.2 Safe approach distance—special

32 6.2.3 Guidelines for the development and use of alternative safe approach distances—special

6.3 Safe approach distances—vehicles

6.3.1 Ordinary persons

6.3.2 Authorised and instructed persons

34 6.4 Safe approach distances—uninsulated mobile plant

6.4.1 General

6.4.2 Ordinary persons

6.4.3 Instructed persons or authorised persons

6.5 Safe approach distance—insulated mobile plant

37 6.6 Emergency approach

6.7 Contact with live high voltage conductors by means of appliances

6.8 Approach to live high voltage insulated cables

6.8.1 General

6.8.2 Earthed metallic sheathed or screened high voltage cables

6.8.3 Non-metallic screened high voltage aerial bundled cable

38 6.9 Work in stations

6.10 Work outside of stations

- 39 7 Operation of high voltage electrical apparatus**
 - 7.1 Persons authorised to operate high voltage electrical apparatus
 - 7.2 Written high voltage switching instructions
 - 7.3 High voltage switching
- 40 8 Earthing of high voltage electrical apparatus**
 - 8.1 General requirements
 - 41 8.2 Earthing for access to high voltage electrical apparatus
 - 8.3 Earthing of overhead lines
 - 8.4 Overhead lines (priority earthing preferences)
 - 8.5 High voltage metal clad switch
 - 42 8.6 High voltage capacitors
 - 8.7 Aerial supervisory cables
- 43 9 Access for work on or near high voltage electrical apparatus**
 - 9.1 General
 - 9.2 Electrical access permit procedure**
 - 9.2.1 Planning for an electrical access permit
 - 44 9.2.2 Multiple working parties
 - 9.2.3 Multiple ownership
 - 9.2.4 Issue, receipt and cancellation of electrical access permits
 - 45 9.2.5 Persons permitted to sign onto electrical access permits
 - 46 9.2.6 Recipient working alone
 - 9.2.7 Issuer also a recipient
 - 9.2.8 Rejection of a recipient
 - 9.2.9 Earthing of electrical apparatus under electrical access permit
 - 47 9.2.10 Temporary cessation of work or absence of recipients
 - 9.2.11 Testing under an electrical access permit
 - 9.2.12 Working on multi-circuit overhead lines
 - 9.2.13 Change of electrical access permit conditions
 - 9.2.14 Cancellation of an electrical access permit
 - 48 9.3 Testing HV electrical apparatus procedure**
 - 9.3.1 General
 - 9.3.2 Planning for testing of high voltage apparatus
 - 49 9.3.3 Sanction for testing procedure
 - 50 9.3.4 Persons permitted to sign onto sanctions for testing

- 51 9.3.5 Responsibilities of tester in charge
- 9.3.6 Complementary sanctions for testing—Responsibilities of tester responsible at remote location
- 9.3.7 Relinquishment of sanctions for testing
- 52 9.4 Out of commission electrical apparatus**
 - 9.4.1 Declaring electrical apparatus out of commission
 - 9.4.2 Access to out of commission electrical apparatus
- 9.5 Suspension of an access authority**
 - 9.5.1 General
 - 9.5.2 Conditions for suspension of an access authority
 - 9.5.3 Procedure for suspension of an access authority
- 53 9.5.4 Procedure for resumption of an access authority
- 9.6 Live work—high voltage**
 - 9.6.1 General
- 54 9.6.2 Minimum requirements
- 9.6.3 Insulating stick work
- 9.6.4 Glove and barrier work
- 9.6.5 Bare hand work
- 9.7 Preparing high voltage electrical apparatus for access**
 - 9.7.1 Isolation and earthing
- 55 9.7.2 Barriers and signs
- 57 9.7.3 Use of a statement of condition of apparatus/plant (SCAP)
- 58 9.7.4 High voltage metal-clad switchgear and associated electrical apparatus
- 9.7.5 Rotating high voltage machines
- 59 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)
 - 9.8.2 Spiking of cables
 - 9.8.3 Working under induced voltage conditions
- 60 10 Placing high voltage electrical apparatus in service**
 - 10.1 Clearance for service**
 - 10.2 Connections to new or out of commission electrical apparatus**

61 11 Low voltage network assets

11.1 General

11.2 Work on or near live low voltage conductors

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

62 12 Work by persons not under the control of the asset owner

12.1 General

12.2 Permit to work adjacent to network assets

63 12.3 Work on abandoned underground cables

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

64 Appendix A—Information to be contained in forms

Application for an access authority

Application for authority to work in the vicinity of electrical apparatus

65 Personal authorisations

Authority to work in the vicinity of electrical apparatus

66 Clearance to place electrical apparatus into service (may also be overhead line clearance and underground cable clearance)

Electrical access permit and sanction for testing

67 Statement of condition of apparatus/plant (SCAP)

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.

1 Purpose

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.

2 Scope

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



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:

//////	
Unrestricted	Less than 10 kV/m
Short term	10kV/m to 30 kV/m
Alternative controls	Greater than 30kV/m

- No time limits apply for exposures below 10kV/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)

Whole working day	0.5 milliTesla (5000 milliGauss)
Short term (two hours per day)	5 milliTesla (50,000 milliGauss)
Limit for limbs (e.g. extended arm)	25 milliTesla (250,000 milliGauss)

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:

Head and trunk	2000 milliTesla
Limbs	8000 milliTesla

Notes:

- 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.
- 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.
- 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.

4 Training and authorisation

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 manual handling, appropriate work methods and an appropriate number of persons *shall* be used to maintain *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.

Figure 2A: Safe approach distance—beyond reach

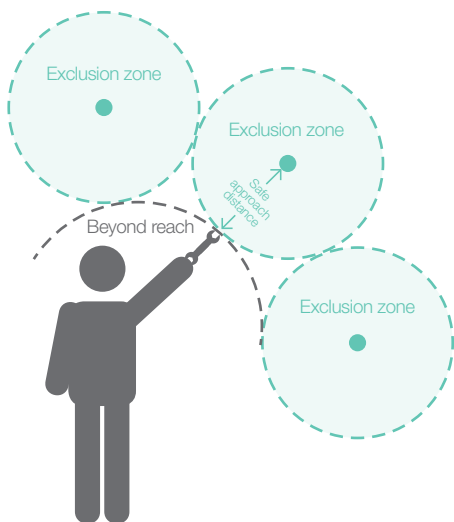
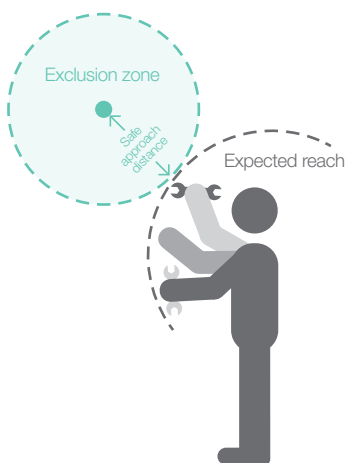


Figure 2B: Safe approach distance—expected reach



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).

Legend:

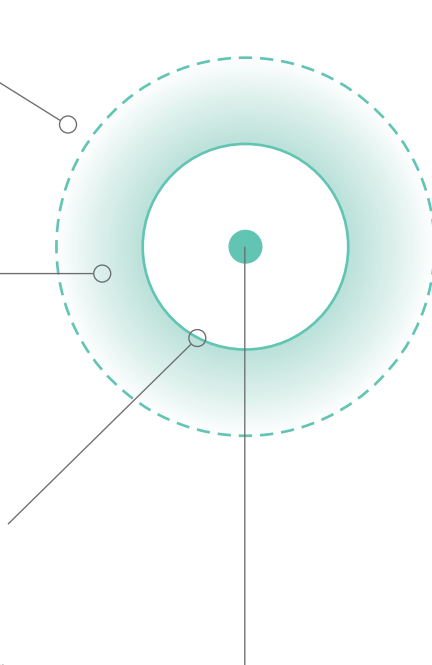
● Conductor

Figure 3: Illustration of differences between *safe approach distance*, *near* and *vicinity*

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.

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

Nominal phase to phase AC Voltage (kV)	Ordinary persons (Note 1) (millimetres)	Instructed persons or authorised persons (Notes 2 and 3) (millimetres)
LV aerial lines	1500	Instructed persons—no contact Authorised persons—insulated contact only
6.6	2000	700
11	2000	700
22	2000	700
33	2000	700
50	2000	750
66	2000	900
110	3000	1000
132	3000	1200
220	4000	1700
275	5000	2300
330	6000	2700
400	6000	3300
500	6000	3600
Nominal pole to earth DC Voltage (kV)		
LV DC aerial line (equal to or less than 1.5 kV)	1500	Instructed persons—no contact Authorised persons—insulated contact only
±25	2000	700
±85	3000	1000
±150	3000	1200
±270	4500	1800
±350	5000	2500
±400	6000	2900

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*

Nominal phase to phase AC voltage (kV)	Authorised persons (millimetres)
LV	<i>Insulated contact only</i>
6.6	450
11	450
22	450
33	500
50	700
66	700

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 3: Safe approach distance for vehicles to live exposed conductors
(except mobile plant when in the working mode)

Nominal phase to phase voltage AC (kV)	Safe approach distance – for vehicles under the control of ordinary persons (Note 1 and 2) (millimetres)	Safe approach distance – for vehicles under the control of instructed persons or authorised persons (Note 1) (millimetres)
Low voltage	600	600
HV up to and including 33	1000	700
50	1000	750
66	1000	1000
110	1500	1000
132	1500	1200
220	4600	1800
275	4600	2300
330	5500	3000
400	6400	3300
500	6400	3900
Nominal pole to earth DC Voltage (kV)		
±25	1000	700
±85	1500	1000
±150	1500	1200
±270	4600	1800
±350	5500	2500
±400	6400	2900

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*

Nominal phase to phase voltage AC (kV)	Safe approach distance— for mobile plant under the control of ordinary persons (Note 1, 4 and 5) (millimetres)	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)	Safe approach distance— for mobile plant under the control of glove & barrier live-line work authorised persons. For insulated mobile plant refer Table 5 (Notes 1, 2 and 3) (millimetres)
Low voltage	2000	1000	380
HV up to and including 33	2000	1200	1000
50	2000	1300	Notes: 1. All distances specified are based on work from a stable surface. Appropriate allowance <i>shall</i> be made for <i>conductor</i> sag and sway and for uncontrolled movement of <i>vehicle</i> or plant due to any reason. 2. A <i>safety observer</i> is required unless the <i>mobile plant</i> is incapable of infringing the <i>safe approach distance</i> . 3. When lifting a load the <i>conductors</i> are suitably <i>insulated</i> in accordance with <i>approved procedures</i> . 4. Including <i>insulated</i> elevating work platforms. 5. See definition for <i>ordinary person</i> . Persons not under control of the asset owner (<i>network operator</i> or <i>HV customer</i>) <i>shall</i> refer to the WorkSafe / ESV No Go Zone Rules and section 12 of the Code.
66	2000	1400	
110	4000	1800	
132	4000	1800	
220	4600	2400	
275	4600	3000	
330	5500	3700	
400	6400	4000	
500	6400	4600	
Nominal phase to phase voltage DC (kV)			
±25	2000	1200	
± 85	4000	1800	
±150	4000	1800	
±270	4600	2400	
±350	5500	3200	
±400	6400	3600	

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

Nominal phase to phase AC voltage (kV)	Safe approach distances (Note 1, 2, 3 and 6) (millimetres)		Working within safe approach distance (Note 1, 3, 4, 5 and 6) (millimetres)	
	Insulated portions	Uninsulated portions	Insulated portions	Uninsulated portions
Low voltage	Contact allowable	1000	Contact allowable	1000
HV up to and including 33	700	1200	Contact allowable	1000
66	1000	1400	Contact allowable	1000
132	1200	1800	Contact allowable	1500
220	1800	2400	Contact allowable	2000
275	2300	3000	Contact allowable	2400
330	3000	3700	Contact allowable	3000
500	3900	4600	Contact allowable	3500
Nominal pole to earth DC voltage (kV)				
± 25	700	1200	Contact allowable	1000
± 85	1000	1800	Contact allowable	1000

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*.

7 Operation of high voltage 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*.

The above *shall* be achieved with the use of appropriate signs and barriers including *live* signs and under *access permit 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 *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 9.7.3.2.

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 9.7.5.

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*”.



For further information go to
www.esv.vic.gov.au or phone
ESV on **(03) 9203 9700**.



Published by Energy Safe Victoria
Level 5
4 Riverside Quay
Southbank VIC 3006

(Version 11/2017)