Victorian Traction Industry Electrical Safety Rules 2014

Revised May 2017
The Victorian Traction Industry Electrical Safety Rules 2014 have been developed with the assistance of:

energysafe VICTORIA

METRO

yarra trams

ETU

Creating a safer state with electricity and gas

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# Victorian railway and tramway electrical safety committee

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Energy Safe Victoria (ESV) is the custodian of the Victorian Traction Industry Electrical Safety Rules 2014 (The Orange Book) and makes available electronic copies through the ESV website at www.esv.vic.gov.au.

The Victorian Traction Industry Electrical Safety Rules 2014 have been prepared by the Victorian railway and tramway electrical safety committee. This committee has been established under section 8 of the Energy Safety Victoria Act 2005. The Victorian Traction Industry Electrical Safety Rules 2014 will be reviewed on an annual basis unless there is a need for them to be reviewed prior to this date.

The Victorian Traction Industry Electrical Safety Rules 2014 provide the guiding electrical safety principles that support the development and review of companies policy and procedures relating to electrical safety.

The Victorian railway and tramway electrical safety committee recognises that railway and tramway companies and their contractors need time to train all relevant workers of the requirements of the Victorian Traction Industry Electrical Safety Rules 2014. The traction industry in Victoria will be expected to be in voluntary compliance with these rules by 1 December 2014.

Energy Safe Victoria endorses the Victorian Traction Industry Electrical Safety Rules 2014 and commends the railway and tramway electrical safety committee members and those industry organisations involved with the development of these electrical safety rules.
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Definitions

For the purpose of these rules, the following definitions shall apply:

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

- **Electrical access permit** means a form of authorisation which 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 to work within safe approach distances, near, or in the vicinity of the network operator’s electrical apparatus.

- **Alive** see live

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

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

- **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 within these rules are:
  - **Authorised applicant** means an approved person who has been assessed as competent against an approved training standard to make application for specified types of access authorities.
  - **Authorised electrical operator (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 and/or traction electrical apparatus.
  - **Authorised recipient** means an approved person who has been assessed as competent against an approved training standard to receive an electrical access authority.

- **Authorised live HV 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.

- **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.

- **Barrier** means a physical device used to prevent access to, or contact with, electrical apparatus. Barriers must be approved for their intended application. Barriers can include approved insulating materials used to provide an insulating screen, of approved design, between persons and electrical apparatus.

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

- **Cable** means an insulated conductor or two or more such conductors laid together, whether with or without fillings, reinforcements or protective coverings.
**Circuit breaker** means a device capable of making, carrying and breaking currents under normal and abnormal circuit conditions, such as short circuit.

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

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

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

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

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

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

**Earthing and phase shorting (for DC refer to short circuiting)** polyphase AC apparatus is deemed to be earthed and phase shorted if it is isolated, has all phases shorted to each other, and is connected to earth in such a manner as to ensure and maintain effective dissipation of electrical energy.

**Earthing and phase shorting device (AC)** means an approved device used for earthing and phase shorting of AC electrical apparatus.

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

**Electrical Traction Control Officer** means the officer responsible for control of all operations on the AC and DC networks of the traction system. This includes electrical system officer (train) and power control officer (tram).

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

**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.

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

**High voltage** or HV means a nominal voltage exceeding 1000 volts AC, or exceeding 1500 volts DC.

**In service** means the status of electrical apparatus connected to the electrical traction system, or in a condition fit to be connected to the system by closing of installed isolators and/or circuit breakers.
Instructed person means a person adequately advised, inducted or supervised by an authorised person to enable them to avoid the dangers that electricity may create.

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

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

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

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

Isolator means a non-load breaking device that when opened, provides the appropriate designed clearances from electrical conductors. It aims to prevent accidental or inadvertent energisation of some part of the circuit.

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

Live line detector means an approved device for determining whether the electrical apparatus is live or not live.

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

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

Mobile plant means cranes, elevating work platforms, tip trucks, 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, not in the working mode when determining safe approach distances.

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.

Negative means the electrical return path of a traction DC network.

Negative conductor means rail, negative bus connections or cabling, poles/structures bonded to the negative rail.

Network asset means any asset that is owned or operated by a network operator for the purposes running the train/tram electrical traction system of the network operator.

Network operator means the owner, controller or operator of an electricity network, or a railway or tramway system.

Nominal voltage means the AC (phase to phase RMS) or DC voltage by which a system of supply is designated.
Not electrically connected means disconnected from all sources of supply by the removal or absence of conductors, appropriate to the voltage and insulating medium. It is not able to be made live by normal operating means and identified in accordance with approved procedures.

Operating authority means an appropriate representative of an organisation, who is responsible for the control of electrical apparatus concerned.

Ordinary person means a person without sufficient training or experience to enable them to avoid the dangers which electrical apparatus may create. Note: ordinary person within these electrical safety rules refers to a person under the control of a network operator.

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

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

Personal protective equipment means approved 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.

Practicable see reasonably practicable.

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

Rail means part of the return circuit of traction power supply system that is connected to the negative bus at the source of supply.

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 to 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
e) the cost of eliminating or reducing the hazard or risk.

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

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.

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

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

**Short-circuit, short-circuited (for AC refer to earthing and phase shorting)** means the connection by a low resistance path between two or more points in an electrical circuit. In the DC traction system, a connection by an approved device between the positive conductor of traction voltage apparatus to rail or rail-connected negative conductor of the apparatus.

**Short circuiting device** (DC) means an approved device used for short-circuiting of DC electrical apparatus

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

**Statement of condition of apparatus and/or plant (SCAP)** means a statement issued by the network operators to other network operators to confirm the condition of specified apparatus and/or plant during the currency of the statement. A SCAP does not authorise access to or work upon the apparatus or plant.

**Substation** means any enclosed or fenced location in which high voltage supply is generated, converted, controlled or transformed.

**Switch** means a device capable of making and breaking load currents. A switch may also serve as an isolator.

**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.

**Traction voltage** means a nominal voltage of 600V DC (for trams) and 1500V DC (for trains).

**Tie station** means substation.

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

**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.

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

The purpose of these electrical safety rules 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 or traction electrical apparatus in Victoria.
These electrical safety rules define the:
- principles
- electrical safety procedures.
These principles and electrical safety procedures apply to all persons working on, near, or in the vicinity of high voltage or traction electrical apparatus capable of being energised.

The electrical safety procedures defined within these rules apply within the traction industry.

These electrical safety rules are also applicable to not electrically connected apparatus. This may be in situations where the required level of isolation, as defined, cannot be confirmed prior to work commencing, for example, on abandoned underground cables.

These electrical safety rules set a minimum standard and should be enhanced by approved procedures. Such procedures may utilise other published standards and guidelines to enhance the level of safety.

In order to comply with the electrical safety procedure requirements of these rules, an organisation shall either:

a) apply the procedures contained within these rules; or
b) vary the procedures by:
- completing a hazard identification and risk assessment
- ensuring the electrical safety outcomes are equal to, or better
- documenting the process
- advising ESV in writing of outcomes and reasons for variation(s) prior to implementing the variation
- or utilising an Electricity Safety Management Scheme (ESMS) process.

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**Figure 1**—Hierarchy of documentation for electrical safety
3 General safety requirements

**Principle**
Consideration shall be given to provide additional procedures covering matters identified relevant to providing a comprehensive safe working environment.

3.1 Safe work method statements, hazard identification, risk assessment and control

Safe work method statements shall be provided for all work that is to be completed for work on or near live electrical apparatus.

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

Prior to working within safe approach distances or near any electrical apparatus, the persons conducting the work shall 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 inadvertent contact with live electrical conductors, shall be given appropriate first aid training on commencement, and thereafter subject to annual competency assessment. Training shall cover skills in cardio-pulmonary resuscitation, shock, burns and incident assessment and management.

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

Guidance for minimum requirement on forms is given 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, DC traction electrical apparatus or performing live-line work shall be specifically approved for the particular application.

All equipment including protective equipment used on high voltage and DC traction electrical apparatus that requires regular testing to prove the effectiveness of insulation, shall be tested at specific intervals as per approved procedures and marked to show the date of the next routine test. 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 and DC traction electrical apparatus or for performing live-line work shall not be relied upon as the sole means of insulation/protection.

Equipment shall not be used after the marked date

3.6 Insulating sticks

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

3.6.2 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 Live line detectors

An approved live line detector shall be used before applying an earth, phase shorting or shalling device to electrical apparatus. The detectors shall be tested immediately before and after use, in accordance with organisational procedures.

3.8 Labelling of electrical apparatus

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

3.9 Ladders

Metallic or wire reinforced ladders shall not be used on, or near, exposed live electrical apparatus, unless approved for use in accordance with approved procedures.
3.10 Personal protective equipment

All persons who may be exposed to possible electric shock, 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.

3.11 Tapes and other measuring devices

Only approved non-conducting tapes and rulers should 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.

3.12 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.

For work near electrical apparatus, use of a safety observer to warn against inadvertent infringement of safe approach distances may be required under:
- these rules, or
- approved procedures, or
- precautions determined appropriate under the hazard identification, risk assessment and control procedures used by the persons conducting the work.

A safety observer shall:
- monitor the work and warn against potential infringement of safe approach distances
- be positioned to effectively observe and immediately communicate with persons performing the work
- have the authority to temporarily suspend the relevant work at any time

General PPE requirements

1. Working on, near or in the vicinity of electrical apparatus approved safety:
   - headwear
   - natural fibre clothing or alternative arc flash protective clothing
   - footwear.
2. For operating electrical apparatus approved safety:
   - headwear
   - footwear
   - natural fibre clothing or alternative arc flash protective clothing
   - hand protection
   - face/eye protection.
3. Supervised visit to a substation with no involvement in any work at that substation and movements confined to normal access ways e.g. roads, paths and stairs.

The person responsible for organising or supervising such visitors is to ensure that they are suitably clothed or covered, and supplied with approved safety headwear.
not perform any other work while acting as safety observer
• be specifically instructed in the duties and workplace hazards applicable
• understand the work process and sequence of work
• be capable of providing assistance in the case of emergency, as well as being competent to perform electrical rescue and cardiopulmonary resuscitation, as required.

3.13 Fit state for work

Alcohol, drugs, diminished mental alertness and 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.

3.14 Work within electric and magnetic fields

3.14.1 General

Persons working within electric and magnetic fields shall be appropriately protected from the annoyance. This is 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 interferences with the medical devices, prior to entering areas of strong electric and magnetic fields.

The electric fields and magnetic fields exposure limits provided on the next page are based upon National Health And Medical Research Council (NHMRC) guidelines.

An ongoing review of these guidelines is presently being carried out by the Australian Radiation Protection And Nuclear Safety Agency (ARPANSA), and information on the activity is available from ARPANSA.

Organisations should apply appropriate exposure limits as per NHMRC guideline or ARPANSA guidelines, whichever is current.
3.14.2 50 Hz electric fields
The National Health And Medical Research Council (NHMRC) interim guidelines for occupational exposure limits for electric fields are as follows:

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<th>Limit</th>
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<tr>
<td>Whole working day</td>
<td>10kV/m</td>
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<tr>
<td>Short term</td>
<td>30kV/m</td>
</tr>
</tbody>
</table>

Short-term exposure to fields between 10kV/m and 30kV/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 20kV/m would be permitted for four hours under IRPA and NHMRC guidelines.

For work situations with field strengths greater than 30kV/m, appropriate measures shall be taken. This 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.

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

a) 50 Hz magnetic fields

<table>
<thead>
<tr>
<th>Duration</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole working day</td>
<td>0.5 milliTesla (5000 milliGauss)</td>
</tr>
<tr>
<td>Short term (Two hours per day)</td>
<td>5 milliTesla (50,000 milliGauss)</td>
</tr>
<tr>
<td>Limit for limbs (e.g. extended arm)</td>
<td>25 milliTesla (250,000 milliGauss)</td>
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b) Static or direct current (DC) magnetic fields

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Limit</th>
</tr>
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<tbody>
<tr>
<td>Head and trunk</td>
<td>2000 milliTesla</td>
</tr>
<tr>
<td>Limbs</td>
<td>8000 milliTesla</td>
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Notes:
1. Caution: due to the 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.

2. 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.

3. When magnetic flux densities exceed 5 milliTesla (static or DC magnetic fields) precautions should be taken to prevent hazards from flying metallic objects.
3.15 Personnel rescue
When a person comes into, and remains in contact with live electrical equipment, do not attempt rescue unless you are trained in live rescue techniques and have the necessary equipment to do so. Immediately contact the electrical traction control officer (ETCO) to arrange isolation or de-energisation of equipment, and wait for confirmation of de-energisation before attempting to move the victim.

3.16 Fire, smoke from high voltage apparatus
Breakdown of electrical equipment may result in fire and issue of a large amount of smoke. Fire or electrical breakdown of some types of electrical insulation may also result in release of toxic fumes. Fire extinguishers and hoses are not designed for use on live high voltage equipment. Immediately contact the ETCO to arrange de-energisation and/or isolation of equipment.

3.17 Fire extinguishers
Fire extinguishers that are marked ‘suitable for use on electrical fires,’ are intended for use on circuits of a voltage lower than those encountered in traction, signal and industrial power supply installations.

Fire extinguishers or fire hoses of any kind MUST NOT be used on live electrical apparatus in traction, signal and industrial power supply installations.

3.18 Unnecessary approach to electrical apparatus
Unnecessary approach to apparatus shall be avoided at all times. Unnecessary contact with metallic items associated with the equipment such as transformer tanks, overhead structures, frames, covers etc., shall be avoided. When necessary, the approach to electrical apparatus shall be restricted to the period required to perform the work.

3.19 Lightning storms
Staff are warned against hazards of working on, or in the vicinity of electrical apparatus forming part of the traction system during electrical storms.

3.20 Current transformer secondary circuits
The secondary circuit of a current transformer shall not be open circuited whilst in service, as a dangerous voltage may be induced on the secondary circuit.

3.21 Interference with earthing or negative connections
Interference or disconnection of earthing or negative cables installed on electrical apparatus may result in serious injury or death.
3.22 Voltage transformers

Extreme care must be taken when working on circuits involving voltage transformers. Following the isolation of the high voltage supply of a transformer, it is possible to obtain a back-feed from the secondary winding.

3.23 Epoxy resin insulated transformers

Particular care must be taken when approaching epoxy resin-insulated transformers installed in a number of the traction network operator’s traction substations. The dielectric strength of the epoxy insulation may not be sufficient to prevent electric shock on direct contact.

3.24 Negative and electrolysis return circuits

Consideration must be given when working on negative return circuits and electrolysis circuits, as hazardous voltages may be present in abnormal circumstances. Hence, some works on these circuits may need to be performed in accordance with the access authorities defined within these rules. Organisational procedures shall be used when working on such circuits.
4 Training and authorisation

**Principle**
Persons working on, or near high voltage and DC traction 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 authorisation for all persons working on, or near high voltage or DC traction electrical apparatus.

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

Persons holding authorisations shall be competency assessed at no more than a nominal three-yearly interval. Training shall be given to restore competency where appropriate.

**4.2 Approved training standard**

**4.2.1 Introduction**
Training will 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 within these electrical safety rules
- knowledge of communication processes required
- knowledge of the relevant approved procedures
- knowledge of the consequences of any physical tasks performed
- working knowledge and skill associated with the relevant:
  - forms and documentation
  - risk assessment
  - work practices
  - 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
- other training requirements as specified herein.

4.2.3 Approved training courses and processes
Organisations shall approve course descriptors and service providers as meeting their recognised needs. The descriptors of each course shall include learning outcomes, assessment criteria and assessment methods, consistent with National Competency Standards.

4.3 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
- an approved procedure 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:
- defining the work area
- isolating and earthing the electrical apparatus
- the use of barriers and signs
- the use of approved covering
- the use of safety observers
- the issue of the appropriate access authority or authority to work in the vicinity of electrical apparatus
- defining access routes.

5.2 Handling objects/ loads
When objects are 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 (refer to section 6) to electrical conductors, the movement of loads shall be controlled by means of approved non-conducting ropes or other approved means.

No person outside the cabin shall contact the load, mobile plant or any attached conducting objects. (Refer to clause 5.4)

5.3 Erection or dismantling of overhead conductors
When overhead lines, other than insulated low voltage service lines, are erected, dismantled, or replaced and there is any possibility of contact with, or induction from, adjacent live conductors of any description, such conductors moved shall be earthed/short circuited by an approved device before work is commenced. This shall remain earthed until the work is completed. A conductor 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 moved.

When earthing is considered to be impractical or a safer control measure may be appropriate, alternative safety precautions shall be applied, subject to the following controls.

a) 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) Documented as an approved procedure specific to the task or process.

5.4 Use of mobile plant

Mobile plant shall only be used in the vicinity of live conductors and/or electrical apparatus once 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:

- isolating and earthing/short circuiting electrical apparatus
- positioning the mobile plant such that the safe approach distance can be maintained in all circumstances
- the use of safety observers and barriers and signs
- the use of other precautions including physical restrictions or control devices in conjunction with barriers
- the suppression of auto-reclose
- the alteration of protection and control settings
- de-energising the electrical apparatus
- mechanical limitation devices options on mobile plant.

Mobile plant, and where appropriate, vehicles, shall be fitted with a trailing earthing conductor when hazards are presented by induced voltages.

When mobile plant may come near (refer to section 6) live electrical apparatus, the mobile plant may be earthed or short circuited if deemed necessary. This shall be achieved by an approved earthing/short circuiting 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 whilst in operation.

Where mobile plant, for example elevated work platform (EWP) is only partially insulated, the following permanent sign shall be fixed at each operator’s station:

**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 organisational procedures, and marked to show the date of the next routine test.
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 operating authority, shall all cooperate to ensure that the work is performed safely and that specific precautions are taken.

5.6 Work within sub stations or on multi-circuit overhead lines with multiple asset ownership
For work within substations 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, joint consideration and agreement shall be reached to carry out the work in a safe manner. (See also 6.10 and 9.2.4)
6 Approach to electrical apparatus

**Principle**
Persons shall observe appropriate safe approach distance when working, operating vehicles or mobile plant, 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 the electrical apparatus into which no part of the person, mobile plant or object, other than approved insulated objects, may encroach unless in accordance with section 9. (Refer to figures 2 and 3)

When working at these distances, work practices shall be established to ensure persons, mobile plant and unapproved objects do not encroach on the safe approach distances.

*Figure 2: Safe approach distance—application*
Conductor means a wire, cable or form of metal designed for carrying electrical current.

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

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

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

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

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

6.2 Safe approach distance—persons

6.2.1 Safe approach distance

The safe approach distances for persons conducting general work are as shown in table 1.

Instructed persons safe approach distances apply whilst undertaking duties under supervision, or as instructed by an authorised person.
Table 1: Safe approach distance for persons to exposed conductors

<table>
<thead>
<tr>
<th>Nominal phase to phase AC voltage kV</th>
<th>Ordinary persons millimetres</th>
<th>Instructed persons or authorised persons (notes 1 and 2) millimetres</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV aerial lines</td>
<td>1500</td>
<td>Instructed persons—300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Authorised persons—insulated contact only</td>
</tr>
<tr>
<td>Not less than 1.0 Not greater than 2.2</td>
<td>2000</td>
<td>Instructed persons — 600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Authorised persons—insulated contact only</td>
</tr>
<tr>
<td>6.6</td>
<td>2000</td>
<td>700</td>
</tr>
<tr>
<td>11</td>
<td>2000</td>
<td>700</td>
</tr>
<tr>
<td>22</td>
<td>2000</td>
<td>700</td>
</tr>
<tr>
<td>33</td>
<td>2000</td>
<td>700</td>
</tr>
<tr>
<td>50</td>
<td>2000</td>
<td>750</td>
</tr>
<tr>
<td>66</td>
<td>2000</td>
<td>900</td>
</tr>
<tr>
<td>110</td>
<td>3000</td>
<td>1000</td>
</tr>
<tr>
<td>132</td>
<td>3000</td>
<td>1200</td>
</tr>
<tr>
<td>220</td>
<td>4000</td>
<td>1700</td>
</tr>
<tr>
<td>275</td>
<td>5000</td>
<td>2300</td>
</tr>
<tr>
<td>330</td>
<td>6000</td>
<td>2700</td>
</tr>
<tr>
<td>400</td>
<td>6000</td>
<td>3300</td>
</tr>
<tr>
<td>500</td>
<td>6000</td>
<td>3600</td>
</tr>
</tbody>
</table>

**Nominal DC voltage**

| LV DC aerial lines (less than 600V) | 1500 | Instructed persons—300 authorised persons—insulated contact only |
| Dc (not less than 600V not greater than 1500V) | 2000 | Instructed persons—300 authorised persons—insulated contact only |

**Notes:**
1. Deliberately avoid movements that could result in distances being infringed.
2. These distances specified are based on work from a stable surface. Appropriate allowance shall be made for conductor sag and sway.
3. For all work near live assets it shall be carried out under a SWMS.
6.2.2 Safe approach distance special

The safe approach distance show in table 2, which may be used for authorised persons conducting general work, was determined using risk analysis methodology, consideration of power frequency, and switching surge distances with a safety margin.

These safe approach distances may only be used in conjunction with the following control measures.

- The safe approach distances shall be maintained from any part of the person’s body, or from any conducting or unapproved object touching any part of the person’s body by using controlled movement.

- 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.

- A person specifically trained and authorised to perform the work at the safe approach distance special.

- Work crew on site risk assessments are conducted.

- Safety observers are used to monitor the work activities.

- Minimise the exposure at the safe approach distance special.

- Addressing adverse impact of external influences on plant and equipment, e.g. traffic, boom movement, footing.

- Addressing adverse impact of weather and environmental conditions, e.g. rain, lightening, wind, light, sag or sway of conductors.

If these controls are not achieved, either access authorities shall be issued, or live work techniques shall be applied. An alternative special safe approach distances and procedures developed can also be applied in accordance with clause 6.2.3.
Table 2: Safe approach distance—special for authorised persons only to exposed conductors

<table>
<thead>
<tr>
<th>Nominal phase to phase AC voltage kV</th>
<th>Authorised persons millimetres</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV Insulated contact only</td>
<td></td>
</tr>
<tr>
<td>Not less than 1.0 Not greater than 2.2</td>
<td>450</td>
</tr>
<tr>
<td>6.6</td>
<td>450</td>
</tr>
<tr>
<td>11</td>
<td>450</td>
</tr>
<tr>
<td>22</td>
<td>450</td>
</tr>
<tr>
<td>33</td>
<td>500</td>
</tr>
<tr>
<td>50</td>
<td>700</td>
</tr>
<tr>
<td>66</td>
<td>700</td>
</tr>
</tbody>
</table>

Nominal DC voltage

<table>
<thead>
<tr>
<th>Voltage kV</th>
<th>Approach distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>600V</td>
<td>300</td>
</tr>
<tr>
<td>1500V</td>
<td>300</td>
</tr>
</tbody>
</table>

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

When determining the special safe approach distance and performing the task the following controls shall be considered:

- ESAA national guidelines for safe approach distances to electrical apparatus. ESAA NENS 04-2003 and/or IEEE 516 and related guidelines as may be appropriate
- clause 9.6 Live work—high voltage.

When developing organisational procedures, special consideration shall be given to:

- flashover
- possibility of inadvertent movement
- minimising the duration of work at the special safe approach distance
- work techniques that provide maximum practical distance from live conductors
- work crew on site risk assessment
- control of inadvertent movement by the use of insulating barriers, insulated plant and appliances and controlled body movements
- environmental conditions.
6.3 Safe approach distances—vehicles

6.3.1 Ordinary persons
An ordinary person in charge of any vehicle, excepting 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 table 3.

6.3.2 Authorised and instructed persons
Authorised and instructed persons in charge of any vehicle, excepting 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 table 3.

Table 3—Safe approach distance for vehicles to exposed live conductors (excepting mobile plant when in the working mode)

<table>
<thead>
<tr>
<th>Nominal phase to phase voltage (AC)</th>
<th>Safe approach distance—for vehicles under the control of ordinary persons (Note 1)</th>
<th>Safe approach distance—for vehicles under the control of instructed persons or authorised persons (Note 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>kV</td>
<td>Millimetres</td>
<td>Millimetres</td>
</tr>
<tr>
<td>Low voltage</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>HV up to and including 33</td>
<td>1000</td>
<td>700</td>
</tr>
<tr>
<td>50</td>
<td>1000</td>
<td>750</td>
</tr>
<tr>
<td>66</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>110</td>
<td>1500</td>
<td>1000</td>
</tr>
<tr>
<td>132</td>
<td>1500</td>
<td>1200</td>
</tr>
<tr>
<td>220</td>
<td>4600</td>
<td>1800</td>
</tr>
<tr>
<td>275</td>
<td>4600</td>
<td>2300</td>
</tr>
<tr>
<td>330</td>
<td>5500</td>
<td>2300</td>
</tr>
<tr>
<td>400</td>
<td>6400</td>
<td>3300</td>
</tr>
<tr>
<td>500</td>
<td>6400</td>
<td>3900</td>
</tr>
<tr>
<td>Nominal DC voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 V</td>
<td>700</td>
<td>600</td>
</tr>
<tr>
<td>1500 V</td>
<td>700</td>
<td>600</td>
</tr>
</tbody>
</table>
Table 4—Safe approach distance for mobile plant to exposed live conductors when in the working mode

<table>
<thead>
<tr>
<th>Nominal phase to phase voltage (AC)</th>
<th>Safe approach distance—for mobile plant under the control of ordinary persons (Note 1 and 4)</th>
<th>Safe approach distance—for mobile plant under the control of instructed persons or authorised persons (for insulated mobile plant refer table 5) (Notes 1 and 2)</th>
<th>Safe approach distance—for mobile plant under the control of glove and barrier live-line work authorised persons (for insulated mobile plant refer table 5) (Notes 1, 2 and 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>kV</td>
<td>Millimetres</td>
<td>Millimetres</td>
<td>Millimetres</td>
</tr>
<tr>
<td>Low voltage</td>
<td>2000</td>
<td>1000</td>
<td>380</td>
</tr>
<tr>
<td>HV up to and including 33</td>
<td>2000</td>
<td>1200</td>
<td>1000</td>
</tr>
<tr>
<td>50</td>
<td>2000</td>
<td>1300</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>2000</td>
<td>1400</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>4000</td>
<td>1800</td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>4000</td>
<td>1800</td>
<td></td>
</tr>
<tr>
<td>220</td>
<td>4600</td>
<td>2400</td>
<td></td>
</tr>
<tr>
<td>275</td>
<td>4600</td>
<td>3000</td>
<td></td>
</tr>
<tr>
<td>330</td>
<td>5500</td>
<td>3700</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>6400</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>6400</td>
<td>4600</td>
<td></td>
</tr>
<tr>
<td>Nominal DC voltage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 V</td>
<td>2000</td>
<td>1200 (Note 5)</td>
<td></td>
</tr>
<tr>
<td>1500 V</td>
<td>2000</td>
<td>2000 (Note 5 not less than 500mm)</td>
<td></td>
</tr>
</tbody>
</table>

Notes
1. All distances specified are based on work from a stable surface. Appropriate allowance shall be made for conductor sag and sway and for uncontrolled movement of vehicle or plant due to any reason.
2. A safety observer is required unless the mobile plant is incapable of infringing the safe approach distance.
3. When lifting a load the conductors are suitably insulated in accordance with organisational procedures.
4. Including insulated elevating work platforms.
5. Companies may reduce this clearance in accordance with approved engineering controls and as per company procedures.
6.4 Safe approach distances—un-insulated 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 shall be given to its use during planning of the work. This includes earthing. (Refer to 5.4)

6.4.2 Ordinary persons
An ordinary person in charge of the work shall ensure that the mobile plant, its equipment and load, is not placed or moved within the distances shown in table 4.

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

When working under glove and barrier procedures, and where the conductors and load are suitably insulated, the load should remain a minimum of 380mm (at 22kV) from the conductor, allowing for sag and sway of the conductor. Every effort should be made for the load to avoid accidental contact with the conductors.

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 mobile plant may be developed and applied with consideration of the requirements set out in 6.2.3.

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 organisational procedures.

The insulated portion of mobile plant may contact or encroach at distances less than the safe approach distance to a live conductor specified in table 5, provided it is rated for the purpose for which it is intended to be used.
### Table 5—Safe approach distances to exposed live conductors for insulated mobile plant operated by persons who are instructed or authorised to work on or near exposed conductors.

<table>
<thead>
<tr>
<th>Nominal phase to phase AC voltage (kV)</th>
<th>Safe approach distances (Note 1, 2 and 3) millimetres</th>
<th>Working within safe approach distance (Note 1, 3 and 4) millimetres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insulated portions</td>
<td>Uninsulated portions</td>
</tr>
<tr>
<td>Low voltage</td>
<td>Contact allowable</td>
<td>1000</td>
</tr>
<tr>
<td>HV up to and including 33</td>
<td>700</td>
<td>1200</td>
</tr>
<tr>
<td>66</td>
<td>1000</td>
<td>1400</td>
</tr>
<tr>
<td>220</td>
<td>1800</td>
<td>2400</td>
</tr>
<tr>
<td>275</td>
<td>2300</td>
<td>3000</td>
</tr>
<tr>
<td>330</td>
<td>3000</td>
<td>3700</td>
</tr>
<tr>
<td>500</td>
<td>3900</td>
<td>4600</td>
</tr>
<tr>
<td>Nominal DC voltage kV</td>
<td>600 V</td>
<td>700</td>
</tr>
</tbody>
</table>

**Notes**

1. These distances specified are based on work from a stable surface. Appropriate allowance shall be made for conductor sag and sway, and for uncontrolled movement of the mobile plant for any reason.
2. For ordinary persons refer to table 4.
3. For safe approach distance where contact is allowed, care shall be exercised to prevent unsafe movement of conductors.
4. For live work in accordance with 9.6.3.
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, at a greater than safe approach distances in accordance with organisational procedures.
Safe approach distances shall apply only after the operating authority has established that these requirements can be safely applied.

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 that are specifically designed for movement whilst live, may be moved in accordance with organisational procedures.
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 surfaces of live high voltage cables with earthed metallic sheaths or screens.

6.8.3 Non-metallic screened high voltage aerial bundled cable
No body contact shall be made to external surfaces of live non-metallic screened high voltage aerial bundled cable or exposed support conductors. Suitable live line 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 organisational 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 sub stations/tie stations

A person shall not perform work in any substation/tie station or allow mobile plant to enter any substation/tie station without first obtaining the permission of the operating authority in charge of the substation/tie station. It shall also accept all the conditions imposed by that person in accordance with organisational procedures.

An access authority and/or authority to work in the vicinity of live apparatus (refer clause 5.1) shall be issued where:
- mobile plant, elevating platform or other large vehicles will be used
- the work involves excavation or use of explosives.

6.10 Work outside of substations/tie stations

Work on, or near electrical apparatus outside of substations/tie stations shall be performed after obtaining the permission and direction of the operating authority.
7 Operation of high voltage and DC traction electrical apparatus

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

**Associated duties include**
Isolating, earthing and short-circuiting of electrical apparatus.

7.1 Persons authorised to operate high voltage and DC traction electrical apparatus
Switching and associated duties on high voltage and DC traction electrical apparatus shall be performed by authorised electrical operators whose training, duties and instructions cover the particular electrical apparatus. However, any person may perform operations in the following circumstances:
- when specifically instructed by, or authorised by, the appropriate operating authority
- when specifically instructed by an authorised operator as part of electrical operator training
- in an emergency involving serious risk to persons or property
- where they operate high voltage and DC traction electrical apparatus as part of process control.

7.2 High voltage and DC traction switching
Prior to a high voltage or DC traction switching operations, 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 should be confirmed whenever possible.

When high voltage or DC traction electrical apparatus is operated, the person undertaking the task shall be protected in an approved manner from electric shock, flash or other hazards. (Also refer to 3.10)

7.3 Authority to operate
Under no circumstances shall any circuit breaker, switch or isolator be closed without the prior approval and co-ordination of the electric traction control officer.

No circuit breaker, switch or isolator shall be opened without the permission of the electric traction control officer except in an emergency involving an accident or serious risk of injury.

All switching operations shall be reported to the electric traction control officer as soon as possible after each operation, unless permission has been given by the electric traction control officer to carry out specific operations on defined electrical apparatus.

Localised maintenance systems (e.g. interlocked sidings or depot road isolators) may be exempted from this requirement provided appropriate organisational procedures, training and controls are implemented.
7.4 Operation of circuit breakers and switches

Only the approved handle or mechanism shall be used for manual operation of a circuit breaker or switch.

The manual operation of a circuit breaker or switch should be performed in an unhesitating and controlled manner.

After opening or closing a circuit breaker or switch, its correct operation shall be confirmed by inspection of the circuit breaker or switch contacts, if practicable, or by observation of the indicating devices or lamps provided for the purpose.

Where provided, the status of the circuit breaker or switch shall also be confirmed through the direct observation of the output of the circuit breaker or switch.

7.5 Operation of isolators

An isolator shall be opened only after it has been ascertained that the circuit has been opened elsewhere. The may be by means of a circuit breaker or switch and the isolator shall be closed before the circuit breaker or switch is closed.

Notwithstanding the foregoing, an isolator may be used to make or break the excitation current of transformers, the charging current of transmission lines and underground cables, and DC circuit breaker control current when, in the opinion of the electric traction control officer, it is safe to do so.

Only the approved handle, mechanism or operating stick shall be used for operating isolators.

Where practicable, the correct operation of the isolators shall be confirmed by visual inspection.

When opening an isolator by means of an operating stick, the operator shall be in control of the isolator and the isolator is to be reclosed immediately should severe arcing occur across the open contacts.

After closing a latching type isolator, a check must be made to ensure the isolator is effectively latched in.
8 Earthing or short circuiting of high voltage and DC traction electrical apparatus

**Principle**

Earthing or short circuiting devices shall be applied by an authorised person following a safe to earth (or short circuit) confirmation and placed to ensure the safety of the work party.

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**Electrical safety procedures**

**8.1 General**

**8.1.1** Earthing and/or short circuiting devices shall be approved. Only authorised persons shall apply them after the circuit or electrical apparatus is isolated, and after confirmation by tests and inquiry, or visual inspection that the conductors are de-energised.

The operation of the voltage detector shall be checked immediately before the test and, if practicable, immediately after the test. Only approved testers shall be used.

Before attempting to earth or short circuit electrical apparatus, the operator must ensure that the short circuit or earthing and phase shorting devices can be applied safely.

When earthing/or short circuiting is achieved by means of an isolator or switch that can be moved to or from the earth or rail/negative position, the isolator or switch shall be visually inspected to confirm that it has operated correctly.

When it is required that traction voltage apparatus is short circuited to steel overhead structures or poles, care must be taken to ensure that the structure or pole is effectively bonded to the rail. Bonding shall not be damaged, of good quality and of appropriate cross sectional area.

Additional earths and/or short-circuits may be installed or removed in accordance with organisational procedures.

Earthing and shorting devices shall be suitably rated for the task.

**8.1.2** In applying an earthing and/or short circuiting device, it shall be connected to earth (rail/negative conductor) before it is applied to the conductors, and it shall be removed from the conductors before it is disconnected from earth (rail/negative conductor).

**8.1.3** Wherever practicable, an earth and/or short circuit shall be applied and removed by an approved device.

When hand application or removal is unavoidable:

- all phases shall be discharged
- another earth and/or short circuit shall be held in contact with the conductor using an approved device, while the hand earth and/or short circuit is attached or removed
- as per other specific organisational procedures.

Before using a short circuiting and/or earthing and phase shorting device, the operator shall examine it to ensure that it is in good order.
8.1.4 When applying a portable earthing and/or short circuiting device that is not connected to a permanently installed earthing/short circuiting system, it shall be regarded as being liable to become live until the circuit earthing is complete.

8.1.5 There are some situations where an authorised electrical operator cannot comply with the clearances specified as safe approach distances, when applying earths to electrical apparatus during the preparation for access. For example, discharging capacitor banks. In these situations, organisational procedures may permit such approach only to that part of the electrical apparatus which already has local isolation and earthing.

8.2 Earthing and short circuiting for access to high voltage and DC traction electrical apparatus

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

Wherever practicable, earths and/or short circuits shall be placed at the site of the work.

8.3 Removal of earth or short circuits when working under an access authority

During work under an access authority, the recipient in charge may authorise the removal of an earth and/or short circuit for insulation testing, re conductoring, or other purposes. This action is only acceptable if considered necessary and safe, and provided:

- the operating authority that has operational control of the earth and the operating authority who applied the earth agrees
- 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 on issue
- persons likely to be affected by the removal of the earth are notified
- consideration is given to induced voltages.

The earth removed shall be replaced in the same or other equally effective position as soon as practicable.
8.4 Earthing and short circuiting of overhead lines

Where an overhead line can only be earthed using temporarily driven earth spikes, the work planning shall consider protection from the hazards resulting from energisation and step and touch potentials in the event of energisation by any means. This includes 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. Alternatively, earths and/or short circuits shall be applied to both sides of, and as close as practicable to, the proposed break and individually connected to a common earth or negative.

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.

During the discharge, earthing and bonding of overhead lines, no person/s other than the one/s applying the earth shall approach within 6 metres (AC). They should maintain 2 metres (DC) clear of the earthing device, its connections or ladders, poles or structures from which the earthing device is being applied.

8.5 Overhead lines earthing systems

8.5 (A) AC priority earthing

The choice of connection for an earthing device should, where practicable, be made on the basis of the following hierarchy.

1. Permanently installed earthing system or rail/negative as close as possible to the worksite (within 2 kilometres).
2. Earthing ferrule in a concrete pole or earthed structure at the worksite (AC only).
3. Earthing ferrule in a concrete pole as close as possible to the work site (within 2 kilometres).
4. A permanently installed earthing system or concrete pole earthing ferrule within the isolation area.
5. The ground rod of an installed pole stay or permanently driven pole stakes.
6. A temporarily driven spike (AC only).

8.5 (B) DC overhead lines

Where the connection is between the negative conductor and positive conductor, this shall be defined by the companies electrical access procedures.

During the discharge and shorting of overhead lines, person/s other than the person/s applying the bonder should remain 2 metres clear of the immediate work area for duration of the bonding process.

The negative conductor may be:
- rail
- negative bus in substations/tie-stations
- conductive poles/structures boded to the negative rail.
8.6 High voltage and DC traction metal-clad switch units

The 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 operator. The location and number of earths to be applied shall be considered. An authorised person shall be present during such earthing, unless specifically detailed by approved procedures for application by one person.

8.7 Discharge of high voltage and DC traction capacitors

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

For the issue of an access authority, high voltage capacitors shall be isolated and earthed or short circuited in accordance with clause 8.2. In addition, each individual capacitor shall be discharged before it is touched.
9 Access for work on or near high voltage and DC traction electrical apparatus

**Principle**
An appropriate safe access system shall be applied before any work on or near high voltage and DC traction electrical apparatus.

**Electrical safety procedures**

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

- the person is a recipient of an electrical access permit covering that electrical apparatus. The high voltage and DC traction conductors have been discharged, short circuited and/or earthed at the work site. The electrical access permit is available for reference at the site of the work
- the person is a recipient of an electrical access permit covering the conductors of a high voltage or DC traction cable. The de-energised state of the cable at the work site is confirmed in accordance with clause 9.8, and the electrical access permit is available for reference at the site of the work
- 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
- the person is working under the terms of a sanction for testing or alternative approved procedure on that electrical apparatus in accordance with clause 9.3.1
- the electrical apparatus has been declared as out-of-commission in accordance with clause 9.4
- the person is performing live work in accordance with approved procedures
- the person is working in accordance with the requirements of a person who has received an appropriate permit to work adjacent to network assets, authority (refer to section 12)
- the person is working in accordance with the requirements of section 6.

**9.2 Electrical access permit procedure**
A trainee under the direct supervision and with the countersignature of an authorised electrical operator, may issue and cancel an electrical access permit with the prior permission of the electric traction control officer.

Electrical access permits may only be issued on de energised, isolated, short circuited and/or earthed and phase shorted electrical apparatus. Unless organisational procedures determine otherwise.
9.2.1 Application for an electrical access permit
Before making 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 Testing under an electrical access permit
Testing under an electrical access permit may be undertaken in accordance with organisational procedures, which include:

- a risk assessment to ensure that no hazardous voltages and currents will be present as a result of the testing
- that the provisions of clause 8.3 are met.

9.2.3 Multiple working parties
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, there shall be co-ordination in planning and performing the work to ensure that the actions of one party shall not endanger the safety of others.

9.2.4 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.

9.2.5 Issue and receipt of electrical access permits
9.2.5.1 An electrical access permit shall be cancelled or suspended prior to the issue of a sanction for testing on the same electrical apparatus, and only with the permission of the electric traction control officer.

9.2.5.2 Electrical access permits shall be issued and cancelled only by authorised electrical operators, and only with the permission of the electric traction control officer.

9.2.5.3 The authorised electrical operator shall, at the time of issue, describe and show, where practicable, the recipient in charge and all the initial recipients the electrical apparatus covered by the electrical access permit, and the precautions taken.

The authorised electrical operator shall also describe, or point out the nearest points of supply and adjacent live electrical apparatus.

9.2.5.4 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.

9.2.5.5 The issuer and authorised recipients all have a responsibility to ensure that the scope and 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.

9.2.5.6 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.
9.2.5.7 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. This may be before the electrical access permit is issued or during the currency of the work.

9.2.5.8 Subsequent to the issue of an electrical access permit, additional recipients may sign on the electrical access permit, once appropriate instruction by the recipient in charge, or an authorised electrical operator acting with the knowledge of the recipient in charge.

9.2.6 Persons permitted to sign onto electrical access permits
Recipients of an electrical access permit shall be authorised recipients or instructed persons approved 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.

On receipt of an electrical access permit, the recipient-in-charge must ensure that all persons who require access to the apparatus, sign the permit form before commencing work.

The conditions under which authorised recipients shall sign onto an electrical access permit are that the recipient:
- understands the electrical apparatus covered and the limits of the electrical access permit
- is satisfied with the precautions taken
- is aware of the nearest adjacent live electrical apparatus.

The conditions under which an instructed person shall sign onto an electrical access permit are that person:
- understands instructions given on what approach is permitted to the electrical apparatus
- understands instructions given on what activity is permitted to be taken in relation to the electrical apparatus
- agrees to the continuous and close supervision by a nominated authorised recipient.

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

9.2.8 Absence of an earth on electrical apparatus under electrical access permit
Electrical apparatus shall be earthed/short circuited before the issue of an electrical access permit, wherever practicable.

Where an earth/short circuit 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/short circuiting of the electrical apparatus. Such instances shall be before any recipient touches the high voltage or DC traction conductors.
9.2.9 Recipient working alone
An electrical access permit may be issued to one authorised recipient, or a recipient may work alone under the terms of an electrical access permit, only in accordance with approved procedures.

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

9.2.11 Temporary cessation of work or absence of recipients
Following a 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.

9.2.12 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 whilst others remain live, the recipient-in-charge shall ensure that each member of the work party who approaches near any circuits correctly identify the circuit/s under electrical access permit and all other circuits and maintain the appropriate safe approach distances.

Each recipient of the work party who approaches near any circuits shall correctly identify the circuit/s under electrical access permit, all other circuits and maintain the appropriate safe approach distances.

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:

- ensure that all recipients signed on the electrical access permit have ceased work covered by the electrical access permit and have signed off
- ensure that all recipients and equipment are clear and will remain clear of the electrical apparatus
- sign off the electrical access permit as the recipient-in-charge to indicate that the electrical access permit can be cancelled
• advise the operating authority of any condition of the electrical apparatus which 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 organisational procedures should be implemented with instruction for signing off recipients where the recipients could not sign-off in person.

9.3 Testing HV and DC traction electrical apparatus procedure
9.3.1 General
The sanction for testing procedure or an alternative approved procedure shall be used.

An alternative approved procedure shall satisfy the requirements of 9.3.2 to achieve the same or better safety outcomes.

9.3.2 Sanction for testing procedure
Each sanction for test shall be issued to a tester in charge. The tester in charge shall ensure that all members of the work party who will approach the electrical apparatus sign on the sanction for test. (Refer to 9.3.5)

9.3.2.1 A sanction for testing shall be used if the testing of high voltage or DC traction electrical apparatus has the potential to produce currents hazardous to the human body.

9.3.2.2 A sanction for testing shall be either cancelled or suspended prior to the issue of an electrical access permit on the same electrical apparatus, and only with the permission of the electric traction control officer.

9.3.2.3 A sanction for testing shall be issued and cancelled only by an authorised electrical operator.

9.3.3 Application for a sanction for testing
9.3.3.1 Only an authorised applicant who can establish that the work is properly planned and can be done safely, shall make an application for a sanction for testing. The electrical apparatus and the condition in which it is required shall be accurately defined and the proposed tests adequately described.

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

9.3.4 Persons permitted to sign on sanctions for testing
Persons permitted to sign onto a sanction for testing shall be authorised testers or instructed persons approved to work under that specific sanction for testing.
In the latter case, it shall be the responsibility of the tester in charge, or the tester responsible at the remote location to ensure that such persons are placed in the charge of an authorised tester.

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

- understands the electrical apparatus covered and the limits of the sanction for testing
- is satisfied with the precautions taken
- is aware of the nearest adjacent live electrical apparatus.

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

- understands instructions given on what approach is permitted to the electrical apparatus
- understands instructions given on what activity is permitted to be taken in relation to the electrical apparatus
- 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 those 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 on the sanction for testing form.

#### 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. Adequate precautions should be taken for the safety of all persons.

### 9.3.6 Relinquishment of sanctions for testing

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.

### 9.4 Out of commission electrical apparatus

#### 9.4.1 Declaring electrical apparatus out of commission

An out of commission written declaration shall include a statement of the condition of the electrical apparatus including all relevant auxiliary equipment. This includes control circuits and compressed air supplies.

Where the physical removal of a portion of each of the conductors is impracticable, the racking out of a removable type circuit breaker shall be accepted as the ‘physical disconnection of the conductors’.

Provided safety measures shall be introduced that will prevent/impede the restoration of the removable type circuit breaker using normal operating and isolating procedures. Such measures shall be implemented in accordance with organisational procedures.
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, or sanction for testing.

Although the electrical apparatus is not electrically connected, due regard shall be given to the possibility of inadvertent energisation from adjacent electrical apparatus, induction, lightning, static charges, or other means.

9.5 Suspension of an access authority
Not used by the traction industries.

9.6 Live work high voltage
9.6.1 General
Section 9.6 is not applicable to the operation, washing or testing of live high voltage or DC traction electrical apparatus. Refer to organisational procedures.

Live work shall only be undertaken after first considering performing the work under isolated and earthed/short circuited 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) AS5804 live work standard and related standards and guidelines as may be appropriate
b) electrical and ergonomic distances necessary to prevent flashover
c) possibility of inadvertent movement
d) minimising the duration of work at the live work minimum approach distances
e) work techniques that provide maximum practical distance from live conductors
f) limiting overvoltage conditions by operational or site controls
g) work crew on site risk assessment
h) control of inadvertent movement by the use of insulating barriers, insulated plant and appliances and controlled body movements
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 HV workers
b) persons when specifically instructed and supervised by an authorised live HV worker as part of live HV worker training
c) the risk assessment shall consider as a minimum:
   • the condition of the electrical apparatus
Organisational procedures/processes shall determine if the work can be performed safely live. It is the responsibility of each person on site required to work live to be satisfied that the work can be performed safely.

The procedures for undertaking live work shall include:

a) persons performing live work shall be authorised DC live workers

b) safety observers shall be authorised DC live workers or authorised safety observers for DC live work

c) persons when specifically instructed and supervised by an authorised DC live worker as part of DC live worker training

d) the risk assessment shall consider as a minimum:

- the condition of the electrical apparatus
- proximity of other electrical apparatus
- proximity of earthed equipment and structures
- protection and control settings
- appointment of a safety observer

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

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

9.6.3 Live work

9.6.3.1 Insulating stick work
An authorised live-HV worker may access live high voltage conductors using insulating sticks and at the special safe approach distances as determined through reference to clause 9.6.1.

9.6.3.2 Glove and barrier work
An authorised live-HV 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.

9.6.3.3 Live working on traction conductors DC
DC live work may be carried out only on traction voltage conductors of the electric traction system, and in accordance with approved procedures.
9.6.3.4 Staff permitted to do traction DC live work
Traction DC live work shall only be undertaken by persons who have been trained and assessed as competent in traction DC live work techniques.
The person shall be authorised by the company to undertake DC live work.

9.7 Preparing high voltage and DC traction electrical apparatus for access
High voltage and DC traction electrical apparatus should not be regarded as being safe for the issue of an electrical access permit until it has been isolated, tested and earthed/short circuited.
Consideration shall be given to the isolation of sources of supply from low voltage or secondary circuits.

9.7.1 Isolation and earthing
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.
Earth/short circuits shall be applied as described in clause 8.2.
If earthing is impracticable, other appropriate precautions shall be taken. 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 identify electrical apparatus covered by an access authority
- to identify adjacent live electrical apparatus and related hazard.
Barriers shall not be altered or crossed except in accordance with organisational 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 9.7.2.4). This includes:
- areas where safe approach distances cannot be maintained
- 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 (refer 9.7.2.4) shall be used. One such example is between work areas and adjacent areas containing live high voltage or DC traction electrical apparatus that does not present an electrical hazard to normal pedestrian movement.

9.7.2.4 Descriptions of barriers and signs live (alive) sign
Approved danger sign having 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 having 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/or signs shall be erected:
• to make it clearly evident which electrical apparatus is under electrical access permit, and which is not
• to 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/or signs shall be erected:
• to make it clearly evident which electrical apparatus is under sanction for testing, and which is not
• to 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.

The issue, cancellation, acceptance and relinquishment of SCAP must be authorised or co-ordinated by the electric traction control officer.

9.7.3.2 Use of the SCAP
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 clause 8.3.

The SCAP shall, where practicable, detail all relevant precautions taken for the safety of the work party/ies. 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
b) it is acceptable to all recipients on the associated electrical access permit or sanction for testing
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.

The operating authority accepting a SCAP may inspect and verify the security and adequacy of the precautions, taken by the issuing operating authority.

Where a general statement is used and any isolation point is to be changed (whilst 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.

9.7.4 High voltage and DC traction 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 clause 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. 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.

9.8 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.
  - Where practical the electrical condition of the remote ends of the cable shall be confirmed as isolated and earthed/short-circuited.
  - The person in charge of the work shall personally select the cable to be spiked after careful reference to the appropriate records and use of cable tracers where necessary.
  - An approved cable spiking 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. This may be through induction or other means with appropriate earthing practices and organisational work procedures adopted.
10 Placing high voltage and DC traction electrical apparatus in service

**Principle**
High voltage and DC traction 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:

- the operating authority shall be notified of the intention to make such connection
- 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
  - 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.

On or near means a situation where an electrical worker is working on or near exposed energised conductors or live conductive parts and there is a reasonable possibility that the electrical worker’s body, or any conducting medium the electrical worker may be carrying or touching during the course of the work, may come closer to the exposed energised conductors or live conductive parts than 500 mm.

The term ‘on or near exposed energised conductors or live conductive parts’ does not apply if the uninsulated and energised part is safely and securely shielded by design, or segregated and protected with barricades or insulated shrouding or insulating material to prevent inadvertent or direct contact.
11.3 **Work on or near de-energised low voltage exposed conductors**

11.3.1 Except for protection, control systems, sub/tie 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
   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 and/or short circuits
   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/operator

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

Electrical safety procedures

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

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

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

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

12.2 Permit to work adjacent to electrical assets
Where the safe system of access referred to in clause 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 asset owner/operator shall require a written application to be submitted.

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

The procedure for the permit to work adjacent to network assets shall include:
- an approved issuer
- nominated person in charge of the work
- control measures (precautions) undertaken by the asset owner
- instructions given to the nominated person in charge of the work
- 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/operator, on abandoned underground cables the use of a safe system of access shall be considered by the asset owner/operator.
12.4 Electrical safety rules for vegetation management work near overhead powerlines by non-electrical workers

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
b) has a standard of qualifications, proficiency and experience that enable the person to safely perform the work
c) has been endorsed in writing by the organisation (e.g. the employer) to perform the work
d) has documented a hazard identification and risk assessment
e) has implemented a risk management process to control hazards associated with the work
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 Energy Safe Victoria.

Tree clearing work in this section means the pruning, cutting, trimming or felling of a tree. It is 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 regulations 318 and 319 of the Electricity Safety (Installation Regulations) 2009 for persons who are not employed, engaged or under control of the electrical asset owner.
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 within these rules. 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
- electrical apparatus to be covered
- the precautions to be taken.

Examples of information which could be included are:

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

Examples of information which could be included are:

- details of special requirements by work party e.g. cross referencing to related access authority/ies and instructions to be observed
- unique identification number
- date and endorsement of applicant
- 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
- any limitations or extensions on the type of authority
- the signature of authorising officer
- the date of issue.
The statement could also contain:
- the duration or authorisation review date
- the date of reviews and competency test
- signed statement of acknowledgment by the authorised person
- the knowledge and skill required for the authority
- 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:
- form number
- location of work
- description of work, day, date
- estimated day and date of completion
- instructions to be observed by the work party
- receipt, relinquishment, and canceling
- signatures, time, date.

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 being cleared
- expected commissioning date
- authority to place into service with signature and date from the construction authority
- statement that all construction persons are clear and will treat the apparatus as live and provision for construction persons to sign statement
- statement that all commissioning tests have been completed by the testing authority and provision for the testing authority to sign and date the statement
- 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
- description of works
- statement of when works ready for general inspection.
Electrical access permit and sanction for testing

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

The details could contain:
- for telephone or radio issue additional sections for witness.

Statement of condition of apparatus/plant (SCAP)

The details shall contain:
- statement of certification of conditions of electrical apparatus
- sections for signatures of acceptance, relinquishment and cancellation
- record of electrical access permits issued
- statement which states: this statement covers only the state of the electrical apparatus specified hereon and does not by itself authorise work on the electrical apparatus.